United States Department of Agriculture

Soil Conservation Service

In cooperation with North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and Ashe County Board of Commissioners

Soil Survey of Ashe County, North Carolina

How To Use This Soil Survey

General Soil Map

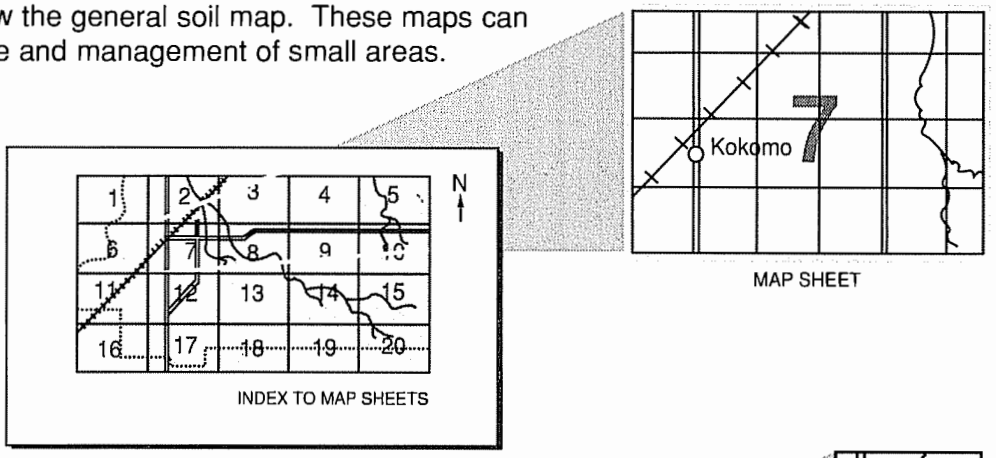
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

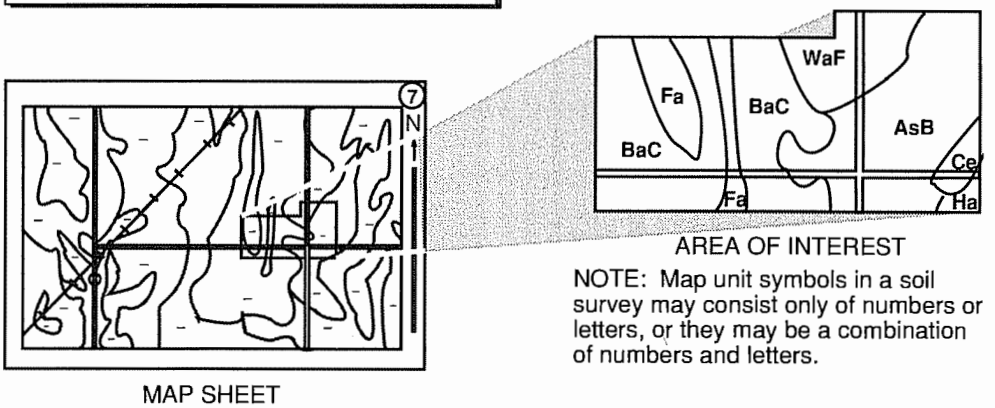
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Research Service, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1980. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service and the North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and Ashe County Board of Commissioners. It is part of the technical assistance furnished to the New River Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

This survey supersedes the soil survey of Ashe County published in 1912 (*4*).

Cover: Typical mountain setting in Ashe County, North Carolina. The foreground is part of the Braddock-Toxaway general soil map unit. The Peak is part of the Porters-Tusquitee-Spivey general soil map unit. (Photo courtesy of North Carolina Farm Bureau News.)

S-414365 0001(00)(14-JAN-84-13:58:09) F9576.SEC 11/07/83

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Foreword

This soil survey contains information that can be used in land-planning programs in Ashe County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Coy A. Garrett
State Conservationist
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S-414365 0006(00)(14-JAN-84-13:58:23) F9577.SEC 6/16/83

Soil Survey of
Ashe County, North Carolina

By Edward O. Brewer, Soil Conservation Service

Soils surveyed by Edward O. Brewer, Robert M. Brown,
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and Joseph A. Hinton, North Carolina Department of Natural Resources
and Community Development

United States Department of Agriculture, Soil Conservation Service
In cooperation with
North Carolina Department of Natural Resources
and Community Development, North Carolina Agricultural
Research Service, North Carolina Agricultural Extension Service,
and the Ashe County Board of Commissioners

Ashe County is a rural mountain county in the northwestern corner of North Carolina (fig. 1). The county takes in 273,280 acres, or approximately 427 square miles. In 1970, the population was 19,571.

Ashe County is in the Blue Ridge Mountain physiographic province. The area is hilly and mountainous and has many mountain peaks, such as The Peak, Bluff, Three Top, Paddy, Phoenix, Little Phoenix, Pond, and Mount Jefferson. Elevation ranges from about 2,480 feet where the New River leaves the county to 5,130 feet atop The Peak. The average elevation is about 3,000 feet.

The entire county is drained by the New River and its tributaries. This drainageway flows northward into the Kanawha River and then into the Ohio River system.

Ashe County is primarily agricultural. Livestock, mostly beef and dairy cattle, account for a large part of the gross income. Forest products, hay, tobacco, corn, and truck crops, such as snap beans, cabbage, and potatoes, make up the rest.

General Nature of the Survey Area

This section gives general information concerning the county. It discusses settlement, water supply, and climate.

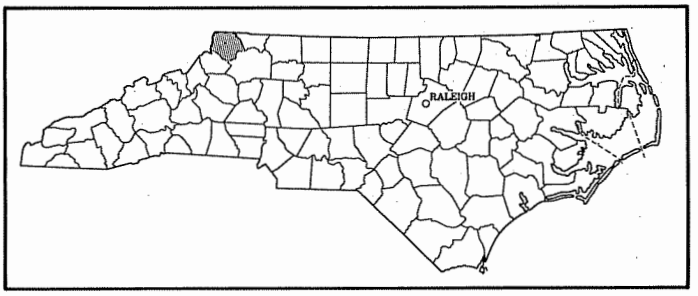

Figure 1.—Location of Ashe County in North Carolina.

Settlement

In 1770, the first settlers in Ashe County came from Virginia on a hunting expedition and built cabins on what was to become Helton's Creek (*3*). The early settlers, mostly of English, Scottish, and German descent, came looking for cheap land suitable for farming. They were attracted by the natural grassy "balds" covered with bluegrass and prized for farmland and by the large and lofty stands of chestnut, black walnut, hickory, maple, buckeye, sugar maple, and pine.

Hunting, trapping, and farming were the main sources of livelihood in the early years of the area. One of the

greatest needs of the early pioneers in Ashe County was for iron farm implements. With no roads and no transportation except pack animal or sled, hauling farm implements across the Blue Ridge Mountains was a problem. Consequently ironworking became the county's first industry. The North Carolina General Assembly passed a law providing a state grant of 3,000 acres of land to any person who would produce 5,000 pounds of iron in a year. Plenty of high-quality iron ore was available, and as early as 1802, iron was being produced and forged in Ashe County from siliceous magnetites. Plows, hoes, wagon wheels, axes, mattocks, and shovels were made. During the War Between the States, tons of ore from Ashe County were used to make gun barrels.

The hilly, mountainous terrain yielded an abundance of wheat, rye, oats, barley, buckwheat, and vegetables, as well as pasture and meadow on which great numbers of cattle were raised.

Jefferston, later changed to Jefferson, became the county seat. It was named for Thomas Jefferson, who was Vice President at the time. West Jefferson, which has a larger population than Jefferson, developed later, when the railroad passed through that area.

Water Supply

The water supply of Ashe County is abundant. The New River and its many tributaries form the stream system of the county. Numerous springs throughout the county feed this system. These springs are a major source of water for rural home and farm use.

Municipal water for the towns of Jefferson and West Jefferson is obtained for the most part from wells. Some springs are used as reserve sources. Most of the smaller towns and villages are installing wells to replace the spring-fed systems of the past.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

In Ashe County in winter, the valleys are very cool, with occasional cold and warm spells, and the upper slopes and mountaintops are generally cold. In summer, the valleys are very warm and frequently hot, and the mountains that are warm during the day become cool at night. Precipitation is heavy and evenly distributed throughout the year. In summer, precipitation falls chiefly during thunderstorms. In winter, precipitation in valleys is chiefly rain and occasionally snow. In the mountains, it is chiefly snow, although rains are frequent. Snow cover does not persist, except at the highest elevations. Heavy rain from prolonged storms, at any time of the year, occasionally causes severe flooding in valleys.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Transou, North Carolina, in the period 1951 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 34 degrees F, and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Transou on December 13, 1962, is -11 degrees. In summer the average temperature is 67 degrees, and the average daily maximum temperature is 78 degrees. The highest recorded temperature, which occurred on July 14, 1954, is 94 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 53 inches. Of this, 27 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 23 inches. The heaviest 1-day rainfall during the period of record was 7.12 inches at Transou on September 30, 1959. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 24 inches. The greatest snow depth at any one time during the period of record was 35 inches. On an average of 11 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 65 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the west-southwest. Average windspeed is highest, 7 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data.

The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Edneyville-Ashe

Moderately steep to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil; on uplands at elevations of 3,000 to 4,000 feet

This map unit is in the northwestern corner of the county in the Grayson and Apple Grove areas. Typically, the landscape consists of narrow ridgetops and long irregularly shaped side slopes with many narrow, winding drainageways.

This map unit makes up about 28 percent of the county. It is about 75 percent Edneyville soils, 5 percent Ashe soils, and 20 percent Evard, Watauga, Porters, Tusquitee, Colvard, and Toxaway soils. The Evard, Watauga, Porters, and Tusquitee soils are on uplands, and the Colvard and Toxaway soils are on narrow flood plains. About three-fourths of the soils in this map unit have slopes greater than 25 percent.

The moderately steep or steep, well drained Edneyville soils are on ridgetops and the upper part of side slopes. Typically, the surface layer is dark brown loam. The subsoil is brown loam in the upper part, strong brown loam in the middle part, and strong brown sandy loam in the lower part. The underlying material is dark yellowish brown and dark gray saprolite that crushes to sandy loam.

The steep or very steep, somewhat excessively drained Ashe soils are on side slopes. Typically, the surface layer is very dark grayish brown gravelly fine sandy loam in the upper part and brown gravelly fine sandy loam in the lower part. The subsoil is yellowish brown loam. The underlying material is yellowish brown saprolite that crushes to sandy loam.

Most of the acreage of this unit is in woodland and pasture. Only a few small areas, generally on ridgetops or narrow flood plains, are in row crops. Most of the soils are suited to pasture and woodland. They are poorly suited to row crops, urban development, and recreation. The slope and hazard of erosion are the main limitations.

2. Porters-Tusquitee-Spivey

Sloping to very steep, well drained soils that have a loamy subsoil; on the higher mountains at elevations above 3,500 feet

This map unit is in the west-central and northwestern parts of the county. It is on The Peak and on Phoenix, Bluff, Three Top, Mount Jefferson, and Old Field Ball Mountains. Typically, the landscape consists of very narrow ridgetops and long, steep side slopes and benches or toe slopes at the base of the mountains. This unit is characterized by many narrow, winding drainageways.

This map unit makes up about 18 percent of the county. It is about 55 percent Porters soils, 14 percent Tusquitee soils, 6 percent Spivey soils, and 25 percent Evard, Edneyville, Ashe, Colvard, and Toxaway soils. The Evard, Edneyville, and Ashe soils are on uplands at the lower elevations, and the Colvard and Toxaway soils are on the narrow flood plains. About three-fourths of this unit is on slopes greater than 25 percent.

The moderately steep to very steep, well drained Porters soils are on side slopes. Typically, the surface layer is very dark grayish brown stony loam in the upper part and dark brown stony loam in the lower part. The subsoil is brown stony loam in the upper part, strong brown stony loam in the middle part, and brown stony loam in the lower part. The underlying material is yellowish brown and strong brown saprolite that crushes to loam.

The sloping to steep, well drained Tusquitee soils are in coves and on toe slopes. Typically, the surface layer is dark brown loam. The subsoil is dark yellowish brown

loam in the upper part, strong brown clay loam in the middle part, and strong brown loam in the lower part. The underlying material is mottled, yellowish brown and grayish brown fine sandy loam.

The moderately steep or steep, well drained Spivey soils are in coves and on toe slopes. Typically, the surface layer is dark brown very cobbly loam. The subsoil is dark yellowish brown very cobbly loam in the upper part and dark brown very cobbly loam in the lower part. The underlying material is yellowish brown very cobbly fine sandy loam.

Most of the acreage of this unit is in woodland, and only a few small areas are in pasture. The nonstony soils, on ridgetops or lower side slopes, are in Fraser firs, which are used for Christmas trees. The soils in this unit are suited to woodland. Most of these soils are poorly suited to row crops, pasture, urban development, and recreation uses. Slope and stoniness are the main limitations.

3. Watauga-Fannin-Chandler

Sloping to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil; on uplands at elevations of 2,600 to 3,500 feet

This map unit is in the southern, eastern, and central parts of the county in the Chestnut Hill and Fleetwood areas. Typically, the landscape consists of narrow ridgetops and sloping to very steep side slopes. All of the major soils in this unit are micaceous.

This map unit makes up about 18 percent of the county. It is about 60 percent Watauga soils, 10 percent Fannin soils, 10 percent Chandler soils, and 20 percent Evard, Clifton, Porters, Tusquitee, Colvard, and Toxaway soils. The Evard, Clifton, Porters, and Tusquitee soils are on uplands. The Colvard and Toxaway soils are on narrow flood plains. On about half the acreage, the soils have slopes of less than 25 percent.

The sloping to steep, well drained Watauga soils are on ridgetops and side slopes. Typically, the surface layer is brown loam. The subsoil is brown loam in the upper part, strong brown loam in the middle part, and strong brown loam in the lower part. The underlying material is pale brown saprolite that crushes to loam.

The sloping to moderately steep, well drained Fannin soils are on broad ridgetops and side slopes. Typically, the surface layer is brown loam. The subsoil is yellowish red clay loam in the upper part and yellowish red loam in the lower part. The underlying material is yellowish red saprolite that crushes to loam.

The steep or very steep, somewhat excessively drained Chandler soils are on side slopes. Typically, the surface layer is dark brown loam in the upper part and brown loam in the lower part. The subsoil is strong brown sandy loam. The underlying material is strong brown and brown saprolite that crushes to fine sandy loam.

About half the acreage of this unit is cleared and used for pasture. The rest is in woodland or row crops. This unit is characterized by a rolling landscape on which pasture for beef cattle and dairy cattle is of importance in the agricultural economy. Row crops are generally grown on the broader ridgetops and on flood plains of this unit. Most of the soils in this unit are well suited to pasture and woodland. On slopes of less than 15 percent, the soils are suited to row crops, urban development, and recreation uses. On slopes greater than 15 percent, they are poorly suited to those uses. Slope and erosion are the main limitations.

4. Evard-Ashe

Moderately steep to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil; on uplands at elevations of 2,700 to 3,500 feet

This map unit is in the northeastern part of the county around Warrensville, Helton, and Grassy Creek. Typically, the landscape consists of side slopes and narrow ridgetops. The side slopes are dissected by many drainageways that form a dendritic drainage pattern.

This map unit makes up about 21 percent of the county. It is about 70 percent Evard soils, 5 percent Ashe soils, and 25 percent Fannin, Edneyville, Clifton, Toxaway, Tusquitee, and Watauga soils. The Fannin, Edneyville, Clifton, Tusquitee, and Watauga soils are on uplands. The Toxaway soils are on narrow flood plains. About two-thirds of the acreage of this unit is on slopes greater than 25 percent.

The moderately steep to very steep, well drained Evard soils are on narrow ridgetops and side slopes. Typically, the surface layer is brown loam. The subsoil is strong brown clay loam in the upper part, yellowish red clay loam in the middle part, and yellowish red sandy loam in the lower part. The underlying material is mottled yellowish red and strong brown saprolite that crushes to sandy loam. In three small areas in the south-central part of the county, these soils are stony. In these areas, rock fragments up to 10 inches or more in size make up 5 to 25 percent of the volume.

The steep or very steep, somewhat excessively drained Ashe soils are on side slopes. Typically, the surface layer is very dark grayish brown gravelly fine sandy loam in the upper part and brown gravelly fine sandy loam in the lower part. The subsoil is yellowish brown loam. The underlying material is yellowish brown saprolite that crushes to sandy loam.

Most of the acreage of these soils is in woodland and pasture; a few small areas on ridgetops and narrow flood plains are in cropland. The soils are suited to woodland. On areas where slope is less than 25 percent, the soils are suited to pasture. On areas where slope is greater than 25 percent, the soils are poorly suited to pasture. They are poorly suited to row crops, urban development,

Figure 2.—Nearly level, very poorly drained Toxaway soils and gently sloping, well drained Braddock soils are some of the most intensively used soils in the county. They are used for both farmland and urban development.

and recreation uses. Slope and erosion are the main limitations to those uses. Stoniness is also a limitation.

5. Clifton-Evard-Fannin

Gently sloping to steep, well drained soils that have a clayey or loamy subsoil; on uplands at elevations of 2,600 to 3,200 feet

This map unit is in the eastern and southern parts of the county around Nathans Creek and Glendale Springs area. Typically, this unit is on broad ridgetops and short side slopes.

This unit makes up about 12 percent of the county. It is about 40 percent Clifton soils, 30 percent Evard soils, 10 percent Fannin soils, and 20 percent Watauga, Chandler, Tusquitee, and Colvard soils. The Watauga, Chandler, and Tusquitee soils are on uplands. The Colvard soils are on narrow flood plains. About half the acreage of this map unit has slope of less than 25 percent.

The gently sloping to moderately steep, well drained Clifton soils are on ridgetops and side slopes. Typically, the surface layer is brown loam. The subsoil is yellowish red sandy clay loam in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material is yellowish red and strong brown saprolite that crushes to loam.

The moderately steep or steep, well drained Evard soils are on side slopes. The surface layer is brown loam. The subsoil is strong brown clay loam in the upper part, yellowish red clay loam in the middle part, and yellowish red sandy loam in the lower part. The underlying material is mottled yellowish red and strong brown saprolite that crushes to sandy loam.

The sloping to moderately steep, well drained Fannin soils are on ridgetops and side slopes. The surface layer is brown loam. The subsoil is yellowish red clay loam in the upper part and yellowish red loam in the lower part. The underlying material is yellowish red saprolite that crushes to loam.

About half the acreage of this map unit is cleared and in row crops or pasture. The rest is in woodland. On most of the acreage of this map unit, the soils are well suited to pasture and woodland. The soils that have slope of less than 8 percent are well suited to row crops, urban development, and recreation uses. The soils that have slope of 8 to 15 percent are suited to those uses, and the soils that have slope of more than 15 percent are poorly suited. Slope and erosion are the main limitations.

6. Braddock-Toxaway

Nearly level to strongly sloping, well drained, poorly drained, and very poorly drained soils that have a dominantly clayey subsoil or loamy underlying material; on terraces and flood plains

This map unit generally is around the towns of Jefferson and West Jefferson. Typically, these areas are on terraces and flood plains.

This map unit makes up only 3 percent of the county, but it is one of the most intensively used units in the county (fig. 2). It is about 60 percent Braddock soils, 15 percent Toxaway soils, and 25 percent Fannin, Clifton, Watauga, and Colvard soils. The Fannin, Clifton, and Watauga soils are on uplands. The Colvard soils are on narrow flood plains. About three-fourths of this unit is on slopes of less than 15 percent.

The gently sloping to strongly sloping, well drained Braddock soils are on terraces between flood plains and the steeper uplands. Typically, the surface layer is dark brown gravelly loam. The subsoil is yellowish red clay loam in the upper part, yellowish red clay in the middle part, and yellowish red gravelly loam in the lower part. The underlying material is yellowish red and strong brown saprolite that crushes to sandy loam.

The nearly level, poorly drained and very poorly drained Toxaway soils are on flood plains. Typically, the surface layer is very dark gray loam. The underlying material is dark gray loam and fine sandy loam over grayish brown, stratified coarse sand, gravel, and cobblestones.

The Braddock soils on terraces are mainly in row crops or in urban development. These soils are well suited to row crops, pasture, woodland, urban development, and recreation uses on slopes that are less than 8 percent. On areas that have slopes of more than 8 percent, the Braddock soils are suited to row crops, urban development, and recreation uses. Here, they are also well suited to pasture and woodland. Slope and erosion are the main limitations. The Toxaway soils, on flood plains, are mainly in pasture, and some areas are in row crops. They are suited to pasture and woodland and are poorly suited to row crops, urban development, or recreation uses. Flooding and wetness are the main limitations. If drained or protected from flooding, Toxaway soils are suited to row crops and well suited to pasture.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and limitation of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Clifton loam, 2 to 8 percent slopes, is one phase in the Clifton series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more major soils or one or more soils and a miscellaneous area (an area that has little or no soil material and supports little or no vegetation). The soils making up a complex, and the miscellaneous area if included, occur in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils and miscellaneous area are somewhat similar in all areas. Braddock-Urban land complex, 2 to 15 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Tusquitee and Spivey stony soils, 15 to 25 percent slopes, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits-Dumps complex is an example of a complex of miscellaneous areas, which are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations and suitabilities for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

AHF—Ashe gravelly fine sandy loam, 25 to 65 percent slopes. This somewhat excessively drained soil is on side slopes throughout the county. Elevation is below 3,500 feet. Mapped areas are irregular in shape and range from 50 to more than 500 acres. Although this map unit was mapped by using fewer detailed observations than were used for most other units in the survey area, the resulting mapped areas meet the needs for the dominant uses of the soil.

Typically, the surface layer, which is 8 inches thick, is very dark grayish brown gravelly fine sandy loam in the upper part and brown gravelly fine sandy loam in the lower part. The subsoil is yellowish brown loam 18 inches thick. The underlying material to a depth of 38 inches is yellowish brown sandy loam. Moderately hard granite gneiss is at 38 inches.

In this Ashe soil, permeability is moderately rapid, and available water capacity is low. Surface runoff is very

rapid, and the hazard of erosion is very severe on bare and exposed areas. The soil is very strongly acid or strongly acid throughout, except where the surface layer has been limed. Gravel or cobblestones cover 15 to 20 percent of the surface area. The depth to bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Chandler, Edneyville, Evard, and Porters soils; areas of a similar soil where the depth to bedrock is less than 20 inches; and areas of exposed bedrock in some places. The somewhat excessively drained, micaceous Chandler soils are on side slopes, mainly in the southern and eastern parts of the county. The well drained Edneyville and Evard soils are on the lower slopes and broader ridgetops. The well drained Porters soils are on the north- and east-facing slopes and are generally at elevations above 3,000 feet. The soils that are less than 20 inches deep to bedrock are mostly on the upper side slopes. The included soils make up about 20 percent of this unit.

Most of the acreage of this Ashe soil is in woodland. Some areas are in pasture.

The dominant trees are chestnut oak, scarlet oak, sweet birch, and white pine. The understory is mainly dogwood, mountain-laurel, sourwood, black locust, red maple, and rhododendron. In some areas along drainageways, the major trees that provide a canopy are yellow-poplar, eastern hemlock, and northern red oak. This is not a choice site for commercial forestry, but the soil will probably remain in woodland. Slope and low available water capacity create a dry site and limit timber production.

This soil is poorly suited to row crops, pasture, and urban and recreation uses. Slope, depth to rock, and low available water capacity are the main limitations.

This Ashe soil is in capability subclass VIIe and woodland group 3r.

BrB—Braddock gravelly loam, 2 to 8 percent slopes. This well drained soil is on stream terraces. It is one of the most intensively used soils in the county. Areas are irregular in shape and range from 5 to 40 acres.

Typically, the surface layer is dark brown gravelly loam 8 inches thick. The subsoil, which is 46 inches thick, is yellowish red and consists of clay loam in the upper part, clay in the middle part, and gravelly loam in the lower part. The underlying material to a depth of 80 inches is yellowish red and strong brown saprolite that crushes to sandy loam.

In this Braddock soil, permeability is moderate, and available water capacity is moderate. Surface runoff is medium, and the erosion hazard is moderate on bare and exposed areas. This soil is very strongly acid or strongly acid throughout, except where the surface layer has been limed. Pebbles and cobblestones cover 10 to 25 percent of the surface area. The depth to bedrock is more than 60 inches.

Included in mapping are small areas of Clifton, Fannin, Watauga, and Tusquitee soils. A few areas of soils that are intermingled throughout this map unit have little or no gravel in the surface layer, and a few areas are eroded. Also included are a few areas of a soil that has less clay in the subsoil than is typical for the Braddock soil and a few areas of moderately well drained soils. The well drained Clifton, Fannin, and Watauga soils are on the upper slopes of the mapped areas. The well drained Tusquitee soils are in draws. The moderately well drained soils are in depressions. The included soils make up about 15 percent of this unit.

Most of the acreage of this Braddock soil is cleared and used for row crops or pasture. The soil is well suited to row crops and pasture and is considered to be one of the most productive soils for farming in the county. The erosion hazard is the main limitation. Minimum tillage, addition of plant nutrients, contour cultivation, and use of crop residue help to control erosion and maintain yields.

A few areas of this soil are in woodland. The dominant trees are white pine, red oak, white oak, yellow-poplar, and hickory. The understory includes red maple, black locust, rhododendron, mountain-laurel, dogwood, sourwood, and American holly.

This soil is well suited to most urban uses. The clayey subsoil, moderate shrink-swell potential, and moderate permeability are the main limitations to urban uses. This soil is well suited to most recreation uses.

This Braddock soil is in capability subclass IIIe and woodland group 2c.

BrD—Braddock gravelly loam, 8 to 15 percent slopes. This well drained soil is on stream terraces. It is one of the more intensively used soils in the county. Mapped areas are irregular in shape and range from 10 to 100 acres.

Typically, the surface layer is dark brown gravelly loam 8 inches thick. The subsoil, which is 46 inches thick, is yellowish red and consists of clay loam in the upper part, clay in the middle part, and gravelly loam in the lower part. The underlying material to a depth of 80 inches is yellowish red and strong brown saprolite that crushes to sandy loam.

In this Braddock soil, permeability is moderate, and available water capacity is moderate. Surface runoff is medium, and the erosion hazard is severe on all bare and exposed areas. This soil is very strongly acid or strongly acid throughout, except where the surface layer has been limed. Pebbles and cobblestones cover 10 to 25 percent of the surface area. The depth to bedrock is more than 60 inches.

Included in mapping are small areas of well drained Clifton, Fannin, Watauga, and Tusquitee soils. A few areas of soils intermingled throughout have little or no gravel in the surface layer, and a few areas are eroded.

Also included are a few areas of a soil that has less clay in the subsoil than is typical for the Braddock soil. The Clifton, Fannin, and Watauga soils are on the upper slopes of the mapped areas. The Tusquitee soils are in small depressions. The included soils make up about 15 percent of this unit.

Most of the acreage of this Braddock soil is cleared and used for row crops, pasture, or urban uses. This soil is suited to most locally grown row crops and is well suited to pasture. The erosion hazard and slope are the main limitations. Additions of plant nutrients, minimum tillage, and the use of cover crops and crop residue help to reduce erosion and maintain yields.

A few areas of this soil are used as woodland. The dominant trees are yellow-poplar, northern red oak, hickory, and white pine. The understory includes red maple, mountain-laurel, rhododendron, dogwood, sourwood, and American holly.

This soil is suited to most urban uses. Slope is the main limitation. The clayey subsoil and low strength may limit some uses. The soil is suited to most recreation uses. Slope is the main limitation to recreation uses.

This Braddock soil is in capability subclass IVe and woodland group 2c.

BuC—Braddock-Urban land complex, 2 to 15 percent slopes. This map unit consists of areas of Braddock soils and areas of Urban land that are so small and so intricately mixed that they could not be separated at the scale used in mapping. About 40 percent of the acreage is Braddock soils, and 35 percent is Urban land. Areas are irregular in shape and range from 5 to 20 acres.

Typically, the Braddock soils have a dark brown gravelly loam surface layer 8 inches thick. The subsoil, which is 46 inches thick, is yellowish red clay loam in the upper part, clay in the middle part, and gravelly loam in the lower part. The underlying material to a depth of 80 inches is yellowish red and strong brown saprolite that crushes to sandy loam.

In these Braddock soils, permeability is moderate, and available water capacity is moderate. Surface runoff is medium, and the hazard of erosion is severe on bare and exposed areas. The soil is very strongly acid or strongly acid, except where the surface has been limed. Pebbles or cobblestones cover 10 to 25 percent of the surface area of these soils. The depth to bedrock is more than 60 inches.

Urban land consists of buildings, parking lots, streets, or other structures that so obscure or alter the soil that identification of the soil is not feasible. Water movement into and through the soil is very restricted, causing rapid surface runoff and the hazard of flooding in low-lying areas.

Included in mapping are small areas of poorly drained soils near drainageways. In most areas these soils have been covered by urban development. Some small areas are cut or filled with soil material and not covered with pavement, buildings, or other structures. Also included are a few areas of Clifton soils and Evard soils. The included soils make up about 25 percent of this unit.

The Braddock soils are suited to urban and recreation uses. Slope and erosion are the main limitations.

Neither a capability subclass nor a woodland group has been assigned to this unit.

CaF—Chandler loam, 25 to 65 percent slopes. This somewhat excessively drained, micaceous soil is on side slopes. Elevation is 2,600 to 3,500 feet. Mapped areas are generally long and irregular in width. They border drainageways and range from 20 to 200 acres.

Typically, the surface layer, which is 8 inches thick, consists of loam that is dark brown in the upper part and brown in the lower part. The subsoil is strong brown sandy loam 22 inches thick. The underlying material to a depth of 80 inches is strong brown and brown saprolite (fig. 3) that crushes to fine sandy loam.

In this Chandler soil, permeability is moderately rapid, and available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is very severe on bare and exposed areas. This soil is very strongly acid or strongly acid throughout, except where the surface layer has been limed. Because of the high mica content, this soil is subject to slides or caving where areas are left bare. The depth to bedrock is more than 60 inches and commonly is 10 feet or more.

Included in mapping are small areas of Watauga, Ashe, and Porters soils. A few small areas of soils that are intermingled throughout this map unit are stony or have rock outcrop. In a few areas, slope is less than 25 percent. The well drained Porters soils are at the higher elevations. The well drained Watauga soils are in the less sloping areas, and the somewhat excessively drained Ashe soils are intermingled throughout the unit. The included soils make up about 20 percent of this unit.

Most of the acreage of this Chandler soil is in woodland. The dominant trees are white pine, chestnut oak, and scarlet oak. The understory includes black locust, red maple, mountain-laurel, rhododendron, dogwood, and sourwood. This soil is not a choice site for commercial forests but will probably remain in woodland. Slope and erosion are the main limitations to woodland use.

This soil is poorly suited to row crops, pasture, or urban and recreation use. Slope and erosion are the main limitations to those uses.

This Chandler soil is in capability subclass VIIe and woodland group 3r.

CfB—Clifton loam, 2 to 8 percent slopes. This well drained soil (fig. 4) is on broad ridgetops where elevations range from 2,800 to 3,200 feet. Mapped areas are irregular in shape and range from 5 to 50 acres.

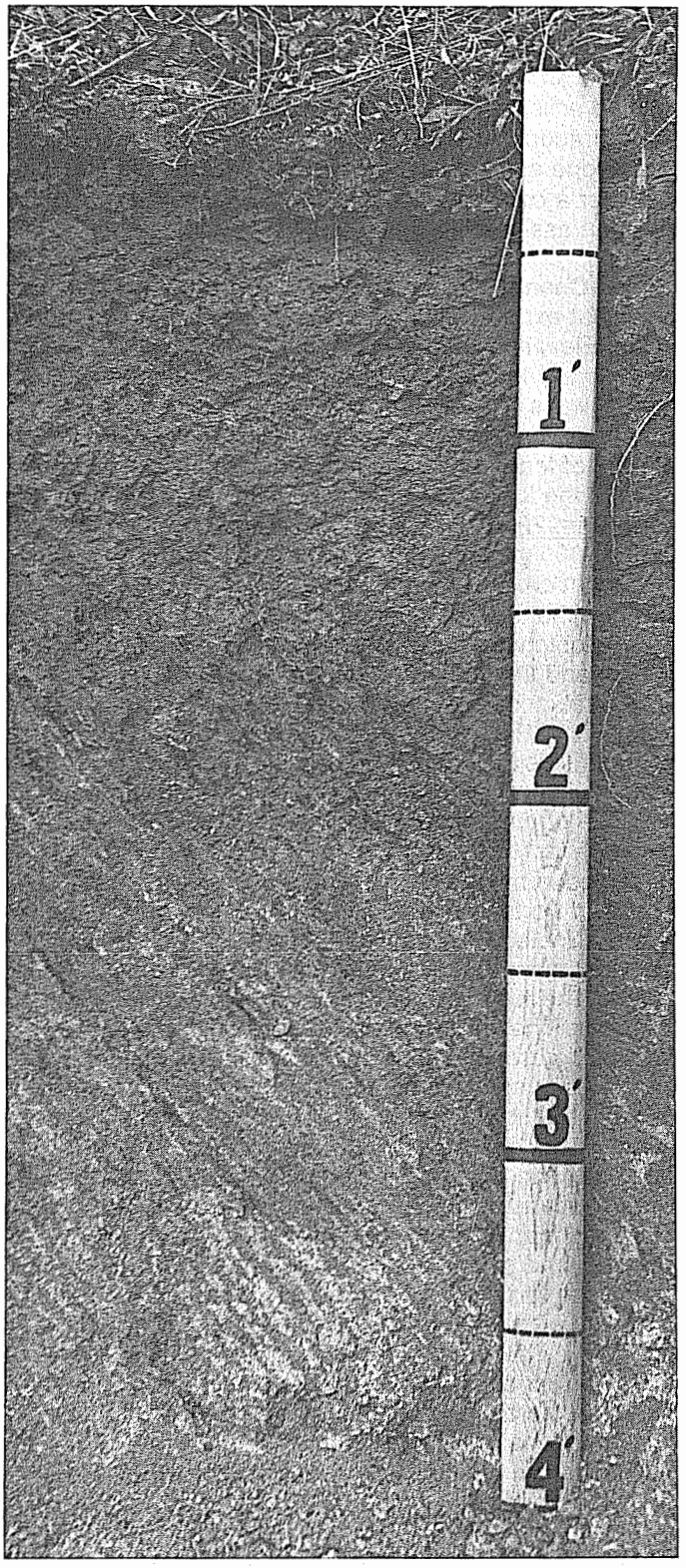

Figure 3.—Profile of Chandler loam. Weathered saprolite is at a depth of about 30 inches.

Typically, the surface layer is brown loam 5 inches thick. The subsoil, which is 40 inches thick, is yellowish red sandy clay loam in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 65 inches is yellowish red and strong brown saprolite that crushes to fine sandy loam.

In this Clifton soil, permeability is moderate, and available water capacity is moderate. Surface runoff is medium, and the hazard of erosion is moderate on bare and exposed areas. This soil is very strongly acid or strongly acid, except where the surface layer has been limed. The depth to bedrock is more than 60 inches.

Included in mapping are small, intermingled areas of well drained Evard and Fannin soils. Also included are a few areas of Braddock soils on the lower parts of this map unit. In some small eroded areas, the surface layer is sandy clay loam or clay loam. Also included are a few small areas where the surface layer is gravelly. In a few mapped areas, this soil contains a high content of mica throughout. The included soils make up about 20 percent of this unit.

Most of the acreage of this Clifton soil has been cleared and is used for row crops, pasture, or urban uses. This soil is well suited to most locally grown row crops and pasture. On cropland or pastureland, erosion is the main limitation. Addition of plant nutrients, minimum tillage, stripcropping, the use of cover crops and of crop residue, and contour tillage help to control erosion and maintain yields.

On this Clifton soil, the dominant native trees are white pine, red oak, scarlet oak, white oak, yellow-poplar, and hickory. The understory includes black locust, dogwood, holly, mountain-laurel, rhododendron, and sourwood.

This soil is well suited to most urban uses. The clayey subsoil is a limitation to the use of the soil for septic tank absorption fields and for sanitary landfills. This soil is well suited to most recreation uses.

This Clifton soil is in capability subclass IIIe and woodland group 2o.

CfD—Clifton loam, 8 to 15 percent slopes. This well drained soil is on the upper side slopes at elevations of 2,800 to 3,200 feet. Areas are narrow bands and range from 5 to 50 acres.

Typically, the surface layer is brown loam 5 inches thick. The subsoil, which is 40 inches thick, is yellowish red sandy clay loam in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 65 inches is yellowish red and strong brown saprolite that crushes to fine sandy loam.

In this Clifton soil, permeability is moderate, and available water capacity is moderate. Surface runoff is medium to rapid, and the hazard of erosion is severe on bare and exposed areas. This soil is very strongly acid or

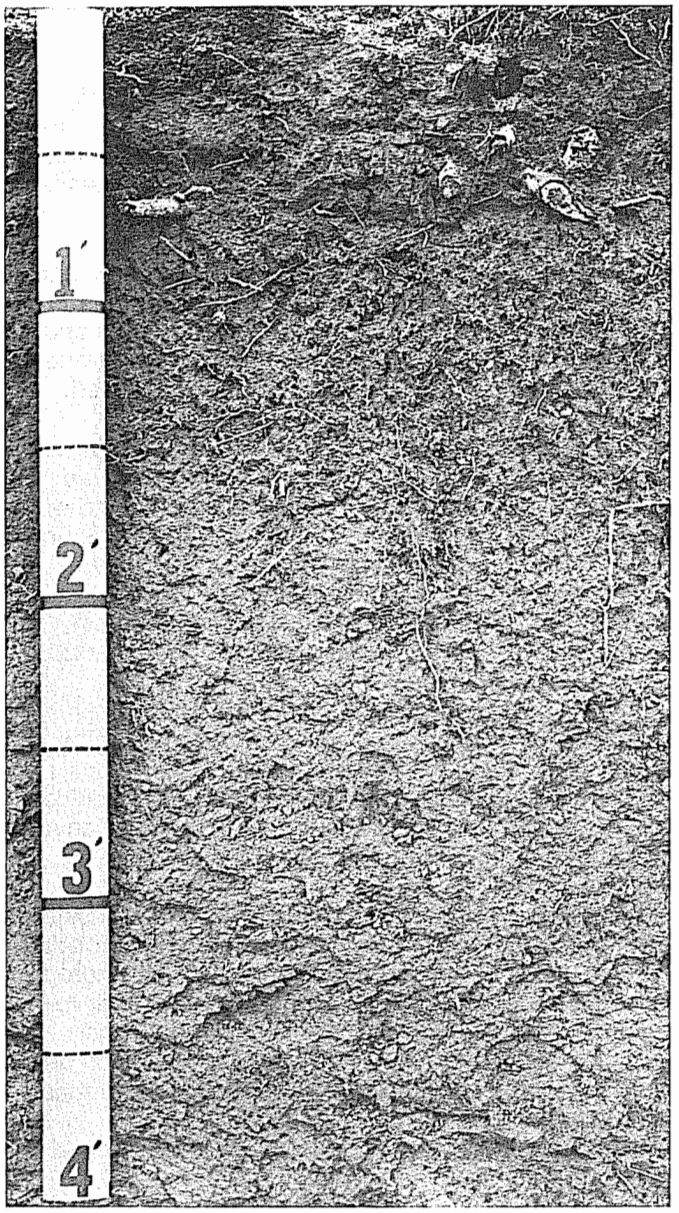

Figure 4.—Profile of well drained Clifton loam. Roots easily penetrate this soil.

strongly acid, except where the surface layer has been limed. The depth to bedrock is more than 60 inches.

Included in mapping are small, intermingled areas of well drained Evard and Fannin soils. Also included are a few areas of Braddock soils on the lower parts of this unit. In some small areas of eroded soils, the surface layer is sandy clay loam or clay loam. Also included are a few small areas of similar soils, where the surface layer is gravelly. In a few mapped areas, this soil is high in content of mica throughout. The included areas make up about 20 percent of this unit.

Most of the acreage of this Clifton soil has been cleared and is used for row crops, pasture, or urban uses. This soil is suited to most locally grown row crops and is well suited to pasture. Erosion and slope are the main limitations. On cropland, the addition of plant nutrients, minimum tillage, stripcropping, the use of cover crops and of crop residue, and contour tillage help to control erosion and maintain yields.

The dominant trees are white pine, red oak, white oak, scarlet oak, yellow-poplar, and hickory. The understory includes dogwood, black locust, holly, mountain-laurel, rhododendron, and sourwood.

This soil is suited to most urban and recreation uses. The clayey subsoil is a limitation to the use of this soil for septic tank absorption fields and sanitary landfills. Slope is also a limitation to those uses.

This Clifton soil is in capability subclass IVe and woodland group 2o.

CfE—Clifton loam, 15 to 25 percent slopes. This well drained soil is on side slopes. Elevation is 2,800 to 3,200 feet. Areas are narrow bands and range from 5 to 50 acres.

Typically, the surface layer is brown loam 5 inches thick. The subsoil, which is 40 inches thick, is yellowish red sandy clay loam in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 65 inches is yellowish red and strong brown saprolite that crushes to fine sandy loam.

In this Clifton soil, permeability is moderate, and available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is severe on bare and exposed areas. This soil is very strongly acid or strongly acid, except where the surface layer has been limed. The depth to bedrock is more than 60 inches.

Included in mapping are small, intermingled areas of well drained Evard and Fannin soils. A few areas of well drained Tusquitee soils are in drainageways. In some small eroded areas of similar soil, the surface layer is sandy clay loam or clay loam. A few gullies may be present. Also included are a few small areas where the soil has a gravelly surface layer. The included areas make up about 20 percent of this unit.

About half the acreage of this Clifton soil is in pasture; a small acreage is in row crops. This soil is poorly suited to row crops. Erosion and slope are the main limitations. The soil is well suited to pasture. Intensive conservation practices are needed to control runoff and reduce erosion if the soil is used for crops.

About half the acreage of this Clifton soil is in woodland. The dominant trees are white pine, red oak, white oak, scarlet oak, hickory, and yellow-poplar. The understory includes black locust, red maple, dogwood,

holly, mountain-laurel, and rhododendron. Slope and erosion are the main limitations to woodland use.

This soil is poorly suited to most urban and recreation uses. The slope and clayey subsoil are the main limitations to those uses.

This Clifton soil is in capability subclass VIe and woodland group 2r.

Co—Colvard fine sandy loam. This nearly level, well drained soil is along the major streams throughout the county. Areas are generally long and narrow and range from 5 to 100 acres.

Typically, the surface layer is dark brown fine sandy loam 10 inches thick. The underlying material to a depth of 60 inches is brown and yellowish brown fine sandy loam in the upper part, yellowish brown loamy sand in the middle part, and brown cobbly sand in the lower part.

In this Colvard soil, permeability is moderately rapid, and available water capacity is moderate. Surface runoff is slow. The seasonal high water table is below a depth of 48 inches. This soil is subject to occasional flooding for very brief periods. This soil is strongly acid through mildly alkaline.

Included in mapping are small areas of a soil that has more sand throughout than is typical for the Colvard soils. Also included are areas of a soil that contains less sand than is typical for the Colvard soils. These soils are at higher elevations and are less subject to flooding than lower lying soils. Also included are small areas of Toxaway and Braddock soils. Toxaway soils are in slight depressions, and the Braddock soils are on adjacent, low terraces. The included soils make up about 20 percent of this unit.

Most of the acreage of this Colvard soil is cleared and in row crops or pasture. The soil is well suited to most locally grown crops (fig. 5). Occasional flooding is the main limitation. The addition of plant nutrients, minimum tillage, and the use of cover crops and of crop residue help to maintain production.

The dominant trees are sycamore, yellow-poplar, black walnut, and white pine. Balm-of-Gilead (balsam poplar) grows along the streambanks on this soil and is a source of "balm buds," the resinous buds that are harvested and sold each spring. Occasional flooding causes some minor problems.

This soil is poorly suited to urban uses, such as dwellings, septic tank filter fields, and small commercial buildings. Occasional flooding and the seasonal high water table are the main limitations to urban uses. The soil is well suited to most recreation uses. Occasional flooding, however, may cause minor problems.

This Colvard soil is in capability subclass IIw and woodland group 1o.

EdE—Edneyville loam, 15 to 25 percent slopes. This well drained soil is on the upper side slopes. Elevation is 3,000 to 4,000 feet. Areas are irregular in shape and are 5 to 100 acres.

Typically, the surface layer is dark brown loam 8 inches thick. The subsoil, which is 20 inches thick, is brown loam in the upper part, strong brown loam in the middle part, and strong brown sandy loam in the lower part. The underlying material to a depth of 62 inches is dark yellowish brown and dark gray saprolite that crushes to fine sandy loam.

In this Edneyville loam, permeability is moderate, and available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is severe on bare and exposed areas. This soil is very strongly acid or strongly acid, except where the surface layer has been limed. The depth to bedrock is greater than 60 inches.

Included in mapping are small areas of Ashe, Evard, and Porters soils. The somewhat excessively drained Ashe soils are on the steeper parts of this unit. The well drained Evard soils are intermingled throughout this unit, and the well drained Porters soils are at the higher elevations. Also included are a few areas of gravelly or stony soils and areas of soils that have slope of less than 15 percent. The included soils make up about 20 percent of this unit.

About half of the acreage of this Edneyville soil is cleared and used for pasture or row crops. The soil is well suited to pasture and poorly suited to row crops. Slope and erosion are the main limitations. The addition of plant nutrients, minimum tillage, and the use of cover crops and of crop residue help control erosion and maintain production.

The dominant trees are white pine, white oak, scarlet oak, hickory, and yellow-poplar. The understory includes red maple, sweet birch, mountain-laurel, rhododendron, sourwood, dogwood, and American holly. Fraser fir for Christmas trees grows well on this soil at the higher elevations. Slope is the main limitation to woodland use.

This soil is poorly suited to most urban and recreation uses. Slope is the main limitation to those uses.

This Edneyville soil is in capability subclass VIe and woodland group 2r.

EdF—Edneyville loam, 25 to 45 percent slopes. This well drained soil is on side slopes. Elevation is between 3,000 and 4,000 feet. The areas are long bands and range from 20 to 500 acres.

Typically, the surface layer is dark brown loam 8 inches thick. The subsoil, which is 20 inches thick, is brown loam in the upper part, strong brown loam in the middle part, and strong brown sandy loam in the lower part. The underlying material to a depth of 62 inches is dark yellowish brown and dark gray saprolite that crushes to fine sandy loam.

In this Edneyville soil, permeability is moderate, and available water capacity is moderate. Surface runoff is very rapid, and the hazard of erosion is very severe on bare and exposed areas. This soil is very strongly acid or

Figure 5.—Burley tobacco on Colvard fine sandy loam.

strongly acid, except where the surface layer has been limed. The depth to bedrock is greater than 60 inches.

Included in mapping are small areas of Ashe, Evard, Porters, and Tusquitee soils. The somewhat excessively drained Ashe soils are on the steeper slopes. The well drained Evard soils are intermingled in the mapped areas, the well drained Porters soils are at the higher elevations, and the well drained Tusquitee soils are throughout the narrow draws or depressions. The included soils make up about 20 percent of this unit.

Most of the acreage of this Edneyville soil is in woodland. The dominant trees are white pine, scarlet oak, white oak, hickory, and yellow-poplar. The understory includes black locust, sweet birch, sourwood, rhododendron, mountain-laurel, dogwood, American holly, and crabapple. This soil is not a choice site for commercial forests but will probably remain in woodland. Slope is the main limitation to woodland use.

This soil is poorly suited to row crops or urban and recreation uses. Slope and erosion are the main limitations to those uses. This soil is suited to pasture. Some areas are in pasture. Slope is the main limitation to this use. Additions of plant nutrients, seeding on the contour, and rotation of grazing to maintain adequate plant height help to reduce erosion and improve yields.

This Edneyville soil is in capability subclass VIe and woodland group 2r.

EsF—Evard stony loam, 25 to 60 percent slopes. This well drained soil is on side slopes bordering drainageways. Elevation is 2,700 to 3,200 feet. Areas are irregular in shape and range from 20 to 400 acres.

Typically, the surface layer is dark brown stony loam 5 inches thick. The subsoil, which is 47 inches thick, is strong brown stony clay loam in the upper part, yellowish red stony clay loam in the middle part, and yellowish red

stony loam in the lower part. The underlying material to a depth of 90 inches is strong brown stony sandy loam.

In this Evard soil, permeability is moderate, and available water capacity is medium. Surface runoff is very rapid, and the hazard of erosion is very severe on bare and exposed areas. This soil is very strongly acid or strongly acid throughout, except where the surface layer has been limed. Rock fragments of gneiss or schist make up about 15 to 25 percent of the volume of the surface layer and about 10 percent of the subsoil. The depth to bedrock is more than 60 inches.

Included in mapping are intermingled areas of somewhat excessively drained Ashe, well drained Edneyville, and well drained Watauga soils. A few areas of well drained Porters soils are on north-facing slopes at higher elevations. Also included are a few areas of similar soils that have slope of less than 25 percent or are nonstony. The included soils make up about 20 percent of this map unit.

Most of the acreage of this Evard soil is in woodland. Some areas are in pasture.

The dominant trees are white pine, chestnut oak, and scarlet oak. In some areas along drainageways, the major trees that provide the canopy are yellow-poplar, northern red oak, and eastern hemlock. The understory includes dogwood, black locust, red maple, mountain-laurel, rhododendron, and sourwood. The soil is not a choice site for commercial forests, but it will probably remain in woodland. Stoniness and slope are the main limitations.

This soil is poorly suited to crops, pasture, or urban and recreation uses. Stoniness and slope are the main limitations.

This Evard soil is in capability subclass VIIe and woodland group 2r.

EvE—Evard loam, 15 to 25 percent slopes. This well drained soil is on the upper side slopes and ridgetops. Elevation is 2,700 to 3,200 feet. Most areas are long and narrow and are 5 to 100 acres.

Typically, the surface layer is brown loam 7 inches thick. The subsoil, which is 29 inches thick, is strong brown clay loam in the upper part, yellowish red clay loam in the middle part, and yellowish red sandy loam in the lower part. The underlying material to a depth of 90 inches is yellowish red and strong brown saprolite that crushes to sandy loam.

In this Evard soil, permeability is moderate, and the available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is severe on bare and exposed areas. This soil is very strongly acid or strongly acid throughout, except where the surface layer has been limed. The depth to bedrock is more than 60 inches.

Included in mapping are small intermingled areas of Fannin, Edneyville, and Clifton soils. A few areas of well drained Porters soils are at the higher elevations. Also included are a few small areas of eroded soils, where the surface layer is sandy clay loam, and a few areas of soils that have a gravelly surface layer. The included soils make up about 20 percent of this unit.

Most of the acreage of this Evard soil is in woodland. The dominant trees are white pine, scarlet oak, white oak, and yellow-poplar. The understory includes dogwood, black locust, mountain-laurel, rhododendron, and sourwood. Slope and erosion are the main limitations.

This soil is poorly suited to row crops. Slope and erosion are the main limitations. This soil is well suited to pasture.

This soil is poorly suited to most urban and recreation uses. Slope limits the use of this soil for septic tank absorption fields, sanitary landfills, roads and streets, and small commercial buildings. Slope is the main limitation for most recreation uses.

This Evard soil is in capability subclass VIe and woodland group 2r.

EvF—Evard loam, 25 to 45 percent slopes. This well drained soil is on side slopes bordering the drainageways. Elevation ranges from 2,700 to 3,200 feet. Areas are long and narrow, and they range from 20 to 200 acres.

Typically, the surface layer is brown loam 7 inches thick. The subsoil, which is 29 inches thick, is strong brown clay loam in the upper part, yellowish red clay loam in the middle part, and yellowish red sandy loam in the lower part. The underlying material to a depth of 90 inches is yellowish red and strong brown fine sandy loam.

In this Evard soil, permeability is moderate, and available water capacity is moderate. Surface runoff is very rapid, and the hazard of erosion is very severe on bare and exposed areas. The soil is very strongly acid or strongly acid throughout, except where the surface layer has been limed. The depth to bedrock is more than 60 inches.

Included in mapping are small areas of Ashe, Edneyville, Watauga, Porters, and Tusquitee soils. The well drained Edneyville and Watauga soils are intermingled throughout this unit. The somewhat excessively drained Ashe soils are on the steeper parts of the unit. The well drained Porters soils are on the north-facing slopes at the higher elevations, and the well drained Tusquitee soils are in small drainageways. Also included are a few areas of eroded soils, where the surface layer is sandy clay loam. A few gullies may be present. The included areas make up about 20 percent of this unit.

Most of the acreage of this Evard soil is in woodland. Some areas are in pasture.

The dominant trees are white pine, white oak, scarlet oak, and chestnut oak. In some areas along drainageways, the major trees that provide a canopy are

Figure 6.—Cabbage on Fannin loam, 8 to 15 percent slopes.

yellow-poplar, northern red oak, and hemlock. The understory includes dogwood, black locust, red maple, mountain-laurel, rhododendron, and sourwood. This soil is not a choice site for commercial forests but will probably remain in woodland. Slope is the main limitation to woodland use.

This soil is poorly suited to crops, pasture, or urban and recreation uses. Slope and erosion are the main limitations.

This Evard soil is in capability subclass VIIe and woodland group 2r.

FnD—Fannin loam, 8 to 15 percent slopes. This well drained, micaceous soil is on ridgetops and upper side slopes. Elevation is 2,600 to 3,200 feet. Areas are irregular in shape and range from 5 to 80 acres.

Typically, the surface layer is brown loam 5 inches thick. The subsoil, which is 30 inches thick, is yellowish red clay loam in the upper part and yellowish red loam in the lower part. The underlying material to a depth of 72 inches is yellowish red saprolite that crushes to loam.

In this Fannin soil, permeability is moderate, and available water capacity is moderate. Surface runoff is medium, and the hazard of erosion is severe on bare and exposed areas. This soil is very strongly acid or strongly acid, except where the surface layer has been limed. The depth to bedrock is more than 60 inches and commonly 10 feet or more.

Included in mapping are a few small, intermingled areas of well drained Clifton, Evard, and Watauga soils. Also included are a few areas of eroded soils, where the surface layer is clay loam. In some small areas on the ridgetops, slopes are less than 8 percent. The included areas make up about 15 percent of this unit.

Most of the acreage of this Fannin soil is cleared and used for row crops or pasture. The soil is suited to most locally grown row crops (fig. 6) and is well suited to pasture. Slope and erosion are the main limitations.

Minimum tillage, stripcropping, cover crops, addition of plant nutrients, and use of crop residue help reduce erosion and maintain yields.

Some areas of this soil are in woodland. The dominant trees are white pine, white oak, red oak, hickory, and yellow-poplar. The understory includes mountain-laurel, rhododendron, dogwood, and sourwood.

This soil is suited to most urban and recreation uses. Slope is the main limitation. Because of the high mica content, this soil is subject to slides and caving if cutbanks are left bare.

This Fannin soil is in capability subclass VIe and woodland group 2o.

FnE—Fannin loam, 15 to 25 percent slopes. This well drained, micaceous soil is on the side slopes bordering the drainageways or above the steeper slopes. Elevation is 2,600 to 3,200 feet. Areas are irregular in shape and range from 5 to 80 acres.

Typically, the surface layer is brown loam 5 inches thick. The subsoil, which is 30 inches thick, is yellowish red clay loam in the upper part and yellowish red loam in the lower part. The underlying material to a depth of 72 inches is yellowish red saprolite that crushes to loam.

Permeability is moderate, and available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is severe on bare and exposed areas. This soil is very strongly acid or strongly acid, except where the surface layer has been limed. The depth to bedrock is more than 60 inches.

Included in mapping are a few small, intermingled areas of well drained Clifton, Evard, and Watauga soils and somewhat excessively drained Chandler soils. Also included are a few areas of eroded soils, where the surface layer is clay loam, and small areas of similar soils, where slope is more than 25 percent. The included soils make up about 20 percent of this unit.

About half the acreage of this Fannin soil is in woodland, and the rest is in pasture.

The dominant trees are white pine, white oak, red oak, yellow-poplar, and hickory. The understory includes black locust, red maple, mountain-laurel, rhododendron, sourwood, and dogwood. Slope is the main limitation.

This soil is well suited to pasture and poorly suited to row crops. Slope and erosion are the main limitations. Intensive conservation practices are needed to effectively control runoff and reduce erosion.

This soil is poorly suited to most urban and recreation uses. Slope is the main limitation to those uses. Because of the high mica content, this soil is subject to slides and caving if cutbanks are left bare.

This Fannin soil is in capability subclass VIIe and woodland group 2r.

Pd—Pits-Dumps complex. This miscellaneous area consists of a site at Ore Knob Mine, where copper ore was mined. The excavated soil and large amounts of rock have been dumped around the mine site, leaving areas of pits and dumps. These areas are barren and erode easily. Very little vegetation grows on the dumps because the material is high in sulfur content.

There are two small gravel pits in this unit. The excavated soil material and rock have left some spoil around the pits.

This unit is poorly suited to crops, pasture, urban or recreation uses, or woodland. Without major reclamation, it is incapable of supporting plant life to any extent. This limitation and the severe erosion hazard are the major limitations. The eroded soil material is a major source of sediment in the area.

Soil interpretations require onsite investigation.

This miscellaneous area was not assigned to a capability subclass or a woodland group.

PsE—Porters stony loam, 15 to 25 percent slopes. This well drained soil is on narrow ridgetops and upper side slopes of the higher mountain uplands. Elevation is about 3,500 feet. The areas are irregular in shape and range from 20 to 200 acres.

Typically, the surface layer is about 11 inches thick. It is very dark grayish brown stony loam in the upper part and dark brown stony loam in the lower part. The subsoil, which is 24 inches thick, is brown stony loam in the upper part, strong brown stony loam in the middle part, and brown stony loam in the lower part. The underlying material to a depth of 42 inches is mottled yellowish brown and strong brown saprolite that crushes to loam containing many stones.

In this Porters soil, the organic matter content of the surface layer is high. Permeability is moderately rapid, and available water capacity is high. Surface runoff is slow under forest cover. This soil is strongly acid or medium acid throughout, except where the surface layer has been limed. Depth to bedrock is 40 to 60 inches.

Included in mapping are small areas of Watauga, Edneyville, Evard, and Tusquitee soils. The well drained Watauga, Edneyville, and Evard soils are intermingled at the lower elevations, and the well drained Tusquitee soils are in drainageways. Also included are small areas of nonstony soils and of soils, on the broader ridgetops, with slope of less than 15 percent. The included areas make up about 20 percent of this unit.

Most of the acreage of this Porters soil is in woodland. Some areas are in pasture.

The dominant trees are white pine, hemlock, northern red oak, white oak, and yellow-poplar. The understory includes red maple, black locust, and sweet birch. On the less stony areas, this soil is used for growing Fraser fir for Christmas trees. Stoniness and slope are the main limitations to woodland use.

This soil is poorly suited to row crops, pasture, or urban and recreation uses. Stoniness and slope are the main limitations. The less stony areas of this soil are suited to pasture and, where accessible, are suited to

dwellings. These areas are prized as sites for summer cottages and vacation homes because of the esthetic value.

This Porters soil is in capability subclass IVs and woodland group 2r.

PsF—Porters stony loam, 25 to 65 percent slopes. This well drained soil is on the side slopes bordering the drainageways of the higher mountains. Elevation is above 3,500 feet. The mapped areas are long bands and range from 40 to 400 acres.

Typically, the surface layer is stony loam about 11 inches thick. It is very dark grayish brown in the upper part and dark brown in the lower part. The subsoil, which is 24 inches thick, is brown stony loam in the upper part, strong brown stony loam in the middle part, and brown stony loam in the lower part. The underlying material to a depth of 42 inches is mottled yellowish brown and strong brown saprolite that crushes to loam containing many stones.

In this Porters soil, permeability is moderately rapid, and the available water capacity is high. The organic matter content of the surface layer is high. Surface runoff is slow under forest cover. The soil is strongly acid or medium acid throughout, except where the surface layer has been limed. Depth to bedrock is 40 to 60 inches.

Included in mapping are small areas of Watauga, Edneyville, Evard, and Tusquitee soils. The well drained Watauga, Edneyville, and Evard soils are at the lower elevations, and the well drained Tusquitee soils are in the narrow draws. Also included are some small areas of nonstony soils and a few areas of similar soils where bedrock is at a depth of less than 40 inches. The included areas make up about 20 percent of this unit.

Most of the acreage of this Porters soil is in woodland. Some areas are in pasture.

The dominant trees are white pine, hemlock, northern red oak, white oak, and yellow-poplar. The understory includes red maple, black locust, and sweet birch. On some of the steeper slopes with northern aspect, the growth of trees, particularly oak, is restricted on the upper part of the slopes. The less sloping, nonstony areas are used for growing Fraser fir for Christmas trees. This soil is not a choice site for commercial forests, but it will probably remain in woodland.

This Porters soil is in capability subclass VIIe and woodland group 2r.

To—Toxaway loam. This nearly level, poorly drained and very poorly drained soil is along the major streams throughout the county. Mapped areas are generally long and narrow and range from 5 to 100 acres.

Typically, the surface layer is very dark gray loam 25 inches thick. The underlying material to a depth of 72 inches is dark gray loam and fine sandy loam in the upper part and grayish brown gravelly coarse sand in the lower part.

The organic matter content is high. Permeability is moderate, and surface runoff is slow to ponded. The soil is strongly acid or medium acid, except where the surface layer has been limed. The seasonal high water table is at or near the surface. This soil is subject to frequent flooding.

Included in mapping are areas of a similar soil that has a lighter colored surface layer than this Toxaway soil. Also included are a few small areas of soils, on flood plains, that have loamy horizons less than 40 inches thick over gravel or cobblestones. In a few small areas are somewhat poorly drained soils and soils that have a clayey subsoil. The included areas make up about 20 percent of this unit.

Most of the acreage of this Toxaway soil is used for pasture or row crops. If drained, this soil is suited to row crops and well suited to pasture. The seasonal high water table and frequent flooding are the main limitations.

On this soil the dominant trees are sycamore, northern red oak, and white ash. Wetness is the main limitation to woodland use.

This soil is generally unsuited to most urban and recreation uses. The seasonal high water table and frequent flooding are the main limitations to those uses.

This soil is in capability subclass IVw if undrained and IIw if drained, and it is in woodland group 2w.

TsD—Tusquitee loam, 8 to 15 percent slopes. This well drained soil is in coves and drainageways and on foot slopes throughout the county. Elevation is 2,600 to 5,000 feet. Mapped areas are long and narrow and range from 5 to 40 acres.

Typically, the surface layer is dark brown loam 10 inches thick. The subsoil, which is 46 inches thick, is dark yellowish brown loam in the upper part, strong brown clay loam in the middle part, and strong brown loam in the lower part. The underlying material to a depth of 60 inches is mottled yellowish brown and grayish brown cobbly fine sandy loam.

The organic matter content is high. Permeability is moderate, and available water capacity is moderate. Surface runoff is medium, and the erosion hazard is moderate on bare and exposed areas. This soil is strongly acid or medium acid throughout, except where the surface layer has been limed. Depth to bedrock is greater than 60 inches.

Included in mapping are small, intermingled areas of the well drained Spivey, Edneyville, and Evard soils. In some small areas, the soils have a lighter colored surface layer. In a few small areas along the drainageways the soils are poorly drained, and in a few areas the soils are gravelly or cobbly. In a few areas of similar soils, slope is less than 8 percent. The included soils make up about 15 percent of this map unit.

Most of the acreage of this Tusquitee soil is cleared and used for row crops and pasture. This soil is suited to all locally grown row crops and pasture. It is a choice soil for gardens, tobacco, and other horticultural crops. Slope is the main limitation. Minimum tillage, contour tillage, addition of plant nutrients, and use of crop residue help to reduce erosion and maintain yields.

The dominant trees are yellow-poplar, white pine, hemlock, northern red oak, white oak, and black walnut. Fraser fir for Christmas trees grows well on this soil. The understory includes mountain-laurel, rhododendron, blueberry, and red maple.

This soil is suited to most urban and recreation uses. Seepage and slope are the main limitations.

This soil is in capability subclass IVe and woodland group 2o.

TsE—Tusquitee loam, 15 to 25 percent slopes. This well drained soil is in coves and drainageways and on foot slopes throughout the county. Elevation ranges from 2,600 to 5,000 feet. Mapped areas are long and narrow and range from 5 to 25 acres.

Typically, the surface layer is dark brown loam 10 inches thick. The subsoil, which is 46 inches thick, is dark yellowish brown loam in the upper part, strong brown clay loam in the middle part, and strong brown loam in the lower part. The underlying material to a depth of 60 inches is mottled yellowish brown and grayish brown cobbly fine sandy loam.

The organic matter content is high. Permeability is moderate, and available water capacity is moderate. Surface runoff is rapid, and the erosion hazard is severe on bare and exposed areas. This soil is strongly acid or medium acid throughout, except where the surface layer has been limed. Depth to bedrock is greater than 60 inches.

Included in mapping are small, intermingled areas of the well drained Spivey, Edneyville, and Evard soils. Also included are small areas of soils that have a lighter colored surface layer; small areas of poorly drained soils along the drainageways; a few areas of soils that have slope of less than 8 percent; and a few areas of gravelly or cobbly soils. The included soils make up about 15 percent of this unit.

About half the acreage of this Tusquitee soil is cleared and used for pasture or crops. The soil is well suited to pasture and is poorly suited to row crops. If it is used for row crops, slope and erosion are the main limitations. Minimum tillage, contour tillage, addition of plant nutrients, and use of crop residue help to reduce erosion and maintain yields.

About half the acreage of this soil is in woodland. The dominant trees are yellow-poplar, black walnut, white pine, hemlock, northern red oak, and hickory. The understory includes mountain-laurel, rhododendron, blueberry, and red maple. Slope is the main limitation to woodland use.

This soil is poorly suited to most urban and recreation uses. Slope is the main limitation.

This soil is in capability subclass VIe and woodland group 2r.

TUE—Tusquitee and Spivey stony soils, 15 to 25 percent slopes. This map unit consists of well drained, stony soils on foot slopes and colluvial fans of the higher mountains in the county. It is about 50 percent Tusquitee stony loam, 30 percent Spivey very stony loam, and 20 percent other soils. Some stones are scattered on the surface. The mapped areas are irregular in shape and range from about 20 to more than 200 acres. Areas of the individual soils were not separated in mapping because they have limited accessibility and similar use and management.

Typically, the Tusquitee soil has a dark brown stony loam surface layer 10 inches thick. The subsoil, which is 46 inches thick, is dark yellowish brown loam in the upper part, strong brown clay loam in the middle part, and strong brown loam in the lower part. The underlying material to a depth of 60 inches is mottled yellowish brown and grayish brown, unconsolidated fine sandy loam material that is about 30 percent by volume cobblestones of gneiss and quartz.

The organic matter content of the Tusquitee soil is high. Permeability is moderate, and available water capacity is medium. Surface runoff is rapid, and the hazard of erosion is severe on bare and exposed areas. This soil is strongly acid or medium acid, except where the surface layer has been limed. Depth to bedrock is greater than 60 inches.

The Spivey soil has a dark brown very stony loam surface layer 18 inches thick. The subsoil, which is 30 inches thick, is dark yellowish brown very cobbly loam in the upper part and dark brown very cobbly loam in the lower part. The underlying material to a depth of 50 inches is yellowish brown very cobbly fine sandy loam.

The organic matter content of the Spivey soil is high. Permeability is moderate to moderately rapid, and the available water capacity is low. Surface runoff is rapid, and the hazard of erosion is severe. The soil is very strongly acid or strongly acid unless the surface has been limed. The depth to bedrock is greater than 40 inches.

Included in mapping are small areas of somewhat excessively drained Ashe soils and well drained Porters and Evard soils on the adjoining uplands at the higher parts of this map unit. Some small, intermingled areas have a lighter colored surface layer. In some areas, slope is less than 15 percent, and in others, there are few or no cobblestones on the surface. The included soils make up about 20 percent of this map unit.

Most of the acreage of this map unit is in woodland. The dominant trees are yellow-poplar, black walnut, northern red oak, scarlet oak, and white oak. The understory includes mountain-laurel, rhododendron,

blueberry, red maple, and black locust. Stoniness and slope are the main limitations to woodland use.

A few areas of this map unit are cleared and used for pasture or row crops. The soils in this unit are poorly suited to row crops, pasture, and urban and recreation uses. Cobblestones, stones, and slope are the main limitations.

The soils in this unit are in capability subclass VIIs and woodland group 2x.

TUF—Tusquitee and Spivey stony soils, 25 to 45 percent slopes. This map unit consists of well drained, stony soils on foot slopes and colluvial fans of the higher mountains in the county. It is about 50 percent Tusquitee stony loam, 30 percent Spivey very stony loam, and 20 percent other soils. Some stones are scattered on the surface. The mapped areas are long and narrow and range from 5 to 40 acres. Areas of these soils were not separated in mapping because they have limited accessibility and similar use and management.

Typically, the Tusquitee soil has a dark brown stony loam surface layer 10 inches thick. The subsoil, which is 46 inches thick, is dark yellowish brown loam in the upper part, strong brown clay loam in the middle part, and strong brown loam in the lower part. The underlying material to a depth of 60 inches is mottled yellowish brown and grayish brown, unconsolidated fine sandy loam material that is about 30 percent by volume cobblestones of gneiss and quartz.

The organic matter content of the Tusquitee soil is high. Permeability is moderate, and available water capacity is moderate. Surface runoff is rapid, and the hazard of erosion is severe on bare and exposed areas. This soil is strongly acid or medium acid, except where the surface layer has been limed. Depth to bedrock is greater than 60 inches.

The Spivey soil has a dark brown very stony loam surface layer 18 inches thick. The subsoil, which is 30 inches thick, is dark yellowish brown very cobbly loam in the upper part and dark brown very cobbly loam in the lower part. The underlying material to a depth of 50 inches is yellowish brown very cobbly fine sandy loam.

The organic matter content of the Spivey soil is high. Permeability is moderate to moderately rapid, and the available water capacity is low. Surface runoff is rapid, and the hazard of erosion is severe. The soil is very strongly acid or strongly acid unless the surface is limed. Depth to bedrock is greater than 40 inches.

Included in mapping are small areas of somewhat excessively drained Ash soils and well drained Porters and Evard soils on the adjoining uplands. Some areas have few or no cobblestones. A few areas of poorly drained soils are in the small drainageways. The included soils make up about 20 percent of this unit.

Most of the acreage of this unit is in woodland. Some areas are in pasture.

The dominant trees are yellow-poplar, black walnut, northern red oak, scarlet oak, and white oak. The understory includes mountain-laurel, rhododendron, blueberry, red maple, and black locust. This unit is not a choice site for commercial forest but will probably remain in woodland. Stoniness and slope are the main limitations to woodland use.

The soils in this unit are poorly suited to row crops, pasture, or urban and recreation uses. Stoniness and slope are the main limitations.

The soils in this unit are in capability subclass VIIs and woodland group 2x.

WaD—Watauga loam, 8 to 15 percent slopes. This well drained, micaceous soil is on the ridgetops and upper side slopes at elevations of 2,600 to 3,500 feet. Mapped areas are irregular in shape and range from 5 to 100 acres.

Typically, the surface layer is brown loam 5 inches thick. The subsoil, which is about 28 inches thick, is brown loam in the upper part, strong brown loam in the middle part, and strong brown loam in the lower part. The underlying material to a depth of 72 inches is pale brown saprolite that crushes to loam.

Permeability is moderate, and available water capacity is medium. Surface runoff is medium, and the hazard of erosion is moderate on bare and exposed areas. This soil is strongly acid or medium acid throughout, except where the surface layer has been limed. Because of the high mica content, this soil is subject to slides or caving if areas are left bare. The depth to bedrock is more than 60 inches and is commonly 10 feet or more.

Included in mapping are small, intermingled areas of well drained Fannin and Evard soils. Also included are small areas, on the broader ridgetops, that have slope of less than 8 percent. Small areas of well drained Tusquitee soils are in drainageways. The included areas make up about 15 percent of this map unit.

Most of the acreage of this Watauga soil is cleared and used for pasture or row crops. The soil is well suited to pasture and is suited to most locally grown crops. Erosion and slope are the main limitations. Minimum tillage, stripcropping, addition of plant nutrients, and use of crop residue help to control erosion and maintain yields.

The dominant trees are white pine, scarlet oak, chestnut oak, white oak, yellow-poplar, and hickory. The understory includes mountain-laurel, rhododendron, dogwood, black locust, red maple, and sourwood. Fraser fir for Christmas trees grows well on this soil at elevations above 3,000 feet.

This soil is suited to most urban and recreation uses. Slope is the main limitation to those uses.

This Watauga soil is in capability subclass IVe and woodland group 2o.

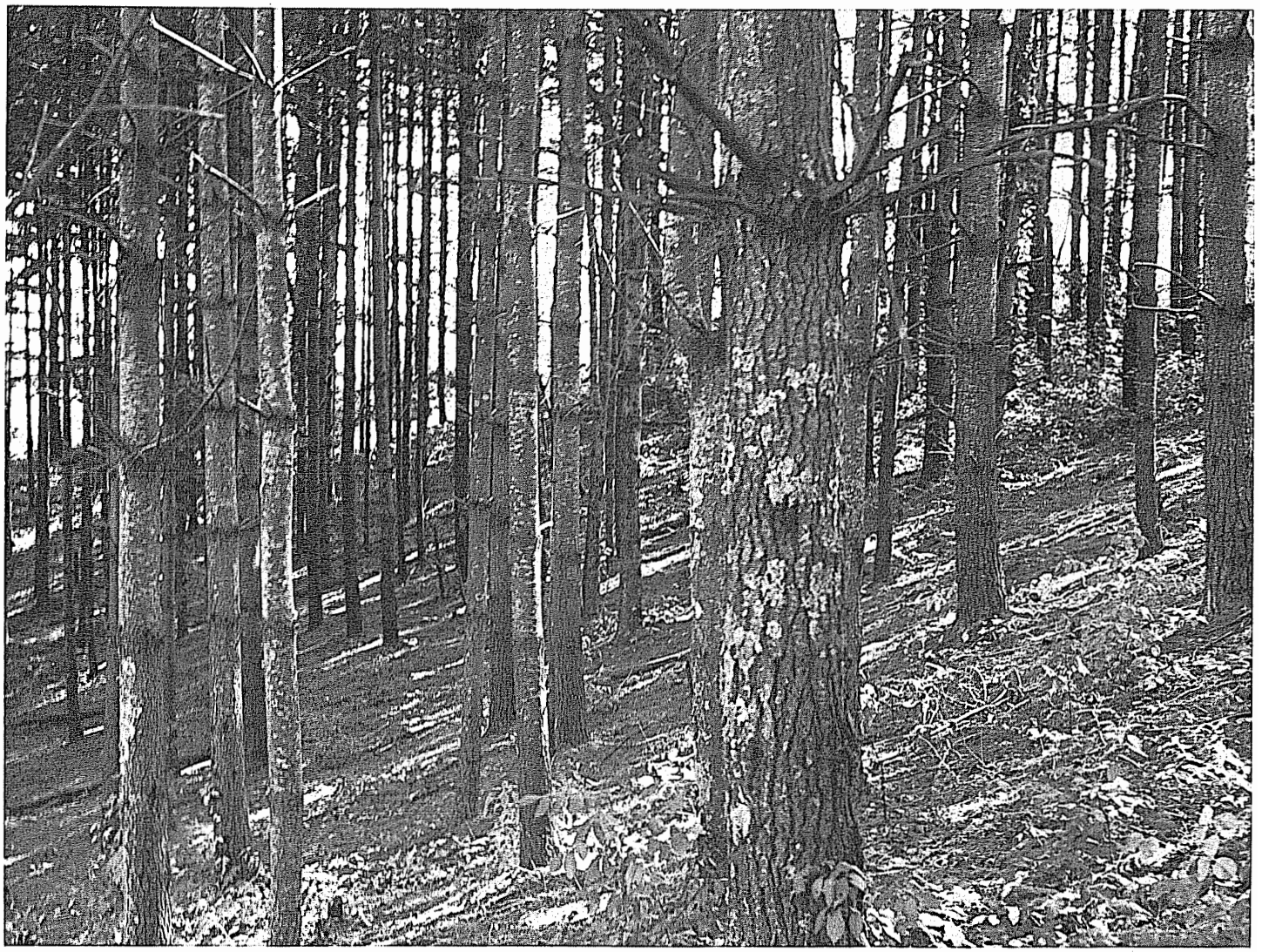

Figure 7.—White pine is dominant on Watauga loam, 15 to 25 percent slopes.

WaE—Watauga loam, 15 to 25 percent slopes. This well drained, micaceous soil is on the side slopes bordering the drainageways or above the steeper side slopes. Elevation is 2,600 to 3,500 feet. The mapped areas are long and narrow and range from 10 to 100 acres.

Typically, the surface layer is brown loam 5 inches thick. The subsoil, which is 28 inches thick, is brown loam in the upper part and strong brown loam in the middle and lower parts. The underlying material to a depth of 72 inches is pale brown saprolite that crushes to loam.

In this Watauga soil, permeability is moderate, and available water capacity is moderate. Surface runoff is rapid, and the erosion hazard is severe on bare and exposed areas. This soil is strongly acid or medium acid throughout, except where the surface layer has been limed. Because of the high mica content, this soil is subject to slides or caving if areas are left bare. The depth to bedrock is 60 inches and commonly 10 feet or more.

Included in mapping are small, intermingled areas of well drained Fannin and Evard soils and the somewhat excessively drained Chandler soils. Small areas of well drained Tusquitee soils are in drainageways. In a few small areas of severely eroded soils, the surface layer is a mixture of the original surface layer and the subsoil. The included areas make up about 20 percent of this unit.

About half the acreage of this Watauga soil is cleared and used for pasture or row crops. The soil is well suited to pasture and poorly suited to row crops. Slope and erosion are the main limitations where new crops are grown. On areas used for crops, intensive conservation practices are needed for controlling runoff and reducing erosion.

About half the acreage of this Watauga soil is woodland. The dominant trees are white pine (fig. 7), scarlet oak, chestnut oak, white oak, yellow-poplar, and hickory. The understory includes mountain-laurel, rhododendron, black locust, red maple, sourwood, and dogwood. Fraser fir for Christmas trees grows well on this soil at elevations above 3,000 feet. Slope is the main limitation to woodland use.

This soil is poorly suited to most urban and recreation uses. Slope is the main limitation.

This Watauga soil is in capability subclass VIe and woodland group 2r.

WaF—Watauga loam, 25 to 45 percent slopes. This well drained, micaceous soil is on steep side slopes bordering the drainageways. Elevation ranges from 2,600 to 3,500 feet. Mapped areas are long bands of 25 to 350 acres.

Typically, the surface layer is brown loam 5 inches thick. The subsoil, which is 28 inches thick, is brown loam in the upper part and strong brown loam in the middle and lower parts. The underlying material to a depth of 72 inches is pale brown saprolite that crushes to loam.

Permeability is moderate, and available water capacity is moderate. Surface runoff is very rapid, and the hazard of erosion is very severe on bare and exposed areas. This soil is strongly acid or medium acid, except where the surface layer has been limed. Because of the high mica content, the soil is subject to slides or caving if areas are left bare. The depth to bedrock is more than 60 inches and commonly 10 feet or more.

Included in mapping are small, intermingled areas of well drained Fannin and Evard soils. Also included, on the steeper slopes, are small areas of somewhat excessively drained Chandler soils. In some areas, the well drained Tusquitee soils are in the drainageways, and in some, stones and rock outcrops are present. The included areas make up about 20 percent of this unit.

Most of the acreage of this Watauga soil is in woodland. Some areas are in pasture.

The dominant trees are white pine, white oak, and scarlet oak. In some areas along drainageways, the major trees that provide a canopy are yellow-poplar, northern red oak, and hemlock. The understory includes mountain-laurel, rhododendron, sourwood, dogwood, black locust, red maple, and holly. Fraser fir for Christmas trees grows well on this soil at elevations above 3,000 feet, although steep slopes cause maintenance and harvesting problems. This soil is not a choice site for commercial forest, but it will likely remain in woodland. Slope is the main limitation to woodland use.

This soil is poorly suited to crops and to urban and recreation uses. Slope and erosion are the main limitations.

This Watauga soil is in capability subclass VIIe and woodland group 2r.

Important Farmland

A few of the soils in Ashe County have a long history of agricultural use. There is much interest in the relative value of the soils for this use.

The soils that qualify as prime farmland and as additional farmland of state and local importance are listed in this section. The lists do not constitute a recommendation for a particular land use.

The location of each listed map unit, or soil, is shown on the detailed soil maps in the back of this publication, and the acreage of each map unit is shown in table 4. Information about soil qualities that affect use and management is in the section "Detailed Soil Map Units."

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses (fig. 8). They either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It also has favorable temperature and growing season and acceptable acidity or alkalinity. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The following map units, or soils, qualify as prime farmland in Ashe County:

BrB Braddock gravelly loam, 2 to 8 percent slopes
CfB Clifton loam, 2 to 8 percent slopes
TsD Tusquitee loam, 8 to 15 percent slopes

These map units make up about 9,000 acres, or about 3 percent of the county. There are many other small areas of prime farmland throughout the southern and eastern parts of the county. These areas are too small to show at the scale used in mapping, however, and are included with map units that meet the requirements of additional farmland of state and local importance.

The loss of prime farmland to other uses puts pressure on marginal lands. In Ashe County, these are the more sloping lands.

Additional Farmland of State and Local Importance

This farmland is land other than that designated as prime farmland. In one or more ways the soil characteristics do not meet the requirements for prime farmland. Farmland of state and local importance can produce crops economically if modern farming methods, including erosion control measures, are used.

Farmland of state and local importance must either be currently used for producing food or fiber or be available for this use. Urban or built-up land and water areas are not included.

Farmland of state and local importance usually has an adequate and dependable supply of moisture from precipitation or irrigation. It has favorable temperature and growing season and acceptable reaction. It has few or no rocks and is permeable to water and air. Slope ranges mainly from 6 to 25 percent.

About 87,600 acres, or about 32 percent, of Ashe County meets the requirements for additional farmland of state and local importance. The areas are scattered throughout the county.

The soils in the following list qualify as farmland of state and local importance:

Figure 8.—Hayland on Braddock gravelly loam, 2 to 8 percent slopes. This prime farmland is well suited to most locally grown crops.

BrD	Braddock gravelly loam, 8 to 15 percent slopes
CfD	Clifton loam, 8 to 15 percent slopes
CfE	Clifton loam, 15 to 25 percent slopes
Co	Colvard fine sandy loam
EdE	Edneyville loam, 15 to 25 percent slopes
EvE	Evard loam, 15 to 25 percent slopes
FnD	Fannin loam, 8 to 15 percent slopes
FnE	Fannin loam, 15 to 25 percent slopes
To	Toxaway loam
TsE	Tusquitee loam, 15 to 25 percent slopes
WaD	Watauga loam, 8 to 15 percent slopes
WaE	Watauga loam, 15 to 25 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the suitabilities and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of roadfill and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Toy N. Campbell, district conservationist, and personnel from the state resource conservationist's office, Soil Conservation Service, helped with this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Land use is constantly changing in Ashe County. The trend appears to be toward more pasture, hayland, and Christmas trees and less cropland and woodland. Some of the more productive cropland and pastureland is being converted to nonfarm uses, such as public roads, public utilities, and housing developments.

According to the 1978 Land Utilization Survey, Ashe County has approximately 22,301 acres of cropland and 84,918 acres of pasture and hayland. The major cultivated crops grown in the county are corn, tobacco, Irish potatoes, snapbeans, and cabbage. Most of the improved pasture and hayland is in orchardgrass or tall fescue and clover. The native pasture is mostly bluegrass and clover. About 650 acres is planted to Fraser fir and 1,000 acres to sheared white pine for Christmas trees.

Special crops grown commercially in the survey area are vegetables, small fruits, tree fruits, and nursery plants. A small acreage is used for melons, strawberries, sweet corn, tomatoes, peppers, and other vegetables and fruits. The latest information on growing special crops, such as site selection, fertilization, liming, and selection of plant varieties, can be obtained from local offices of the Agricultural Extension Service or the Soil Conservation Service.

Cropland Management

Soil erosion is a major concern on about 95 percent of the cleared land in the county. About the only soils in the county that are not subject to erosion are Colvard and Toxaway soils, which are on the flood plains.

Erosion is costly for various reasons. Productivity decreases and soil tilth is impaired if the surface layer is eroded away. Costly herbicides, fertilizer, and lime are carried out of the fields if erosion is left unchecked. The social and environmental costs are also increased if eroded soil material is deposited in lakes and streams. Effective control of erosion increases productivity and

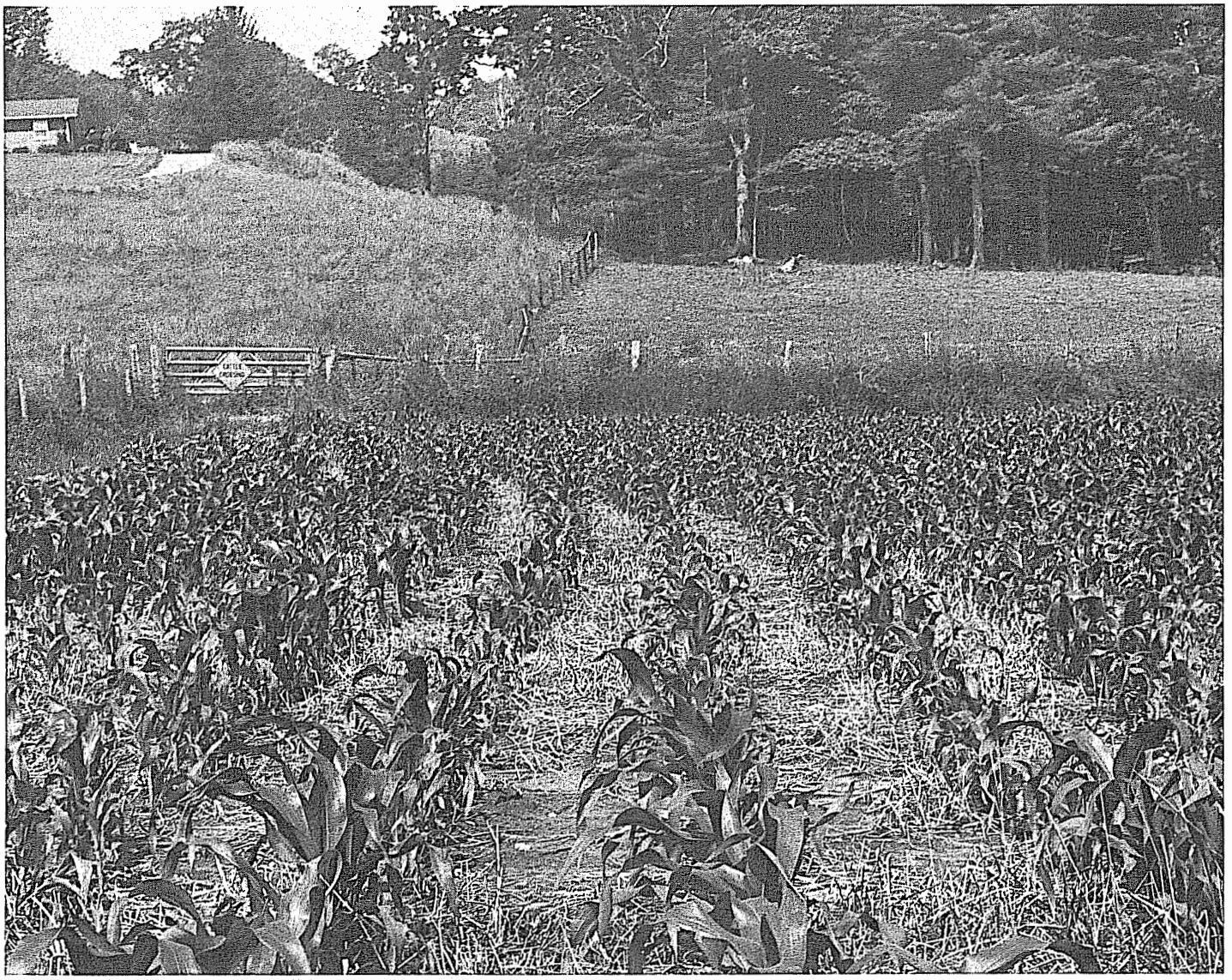

Figure 9.—Corn has been planted in rye sod. Minimum tillage helps to improve tilth and organic matter content of the soil.

minimizes the public cost of maintaining water quality standards.

Erosion control practices provide protective surface cover, reduce runoff, and increase water infiltration into the soil. Maintaining a plant cover on the soil for extended periods holds erosion losses to amounts that will not reduce the productive capacity of the soil.

Because of slope on most of the upland soils in the county, effective conservation systems that include use of no-tillage or minimum tillage (fig. 9), contour cultivation, contour or field stripcropping, diversions, and use of crop residue are needed to control erosion, reduce runoff, improve tilth, and maintain yields. Grassed waterways that provide safe disposal areas for field runoff and field borders that filter sediment-laden field runoff help to control erosion and prevent sediment damage to lower lying areas.

Information on the design and applicability of erosion control practices for each kind of soil can be obtained from the local office of the Soil Conservation Service.

Soil tilth is an important factor in crop production. Seed germination and water infiltration into the soil are highly influenced by soil tilth. Most of the soils that are used for row crops tend to crust after intense rainfalls. The addition of organic materials, such as crop residue, manure, or green-manure cover crops, helps to reduce crusting and improve soil structure and general soil tilth.

Drainage is a major concern of management on a few of the soils, such as Toxaway soils, if they are used for the production of row crops or pasture. These soils are so wet that the production of most locally grown crops is limited unless a drainage system is installed. Drainage can be improved and yields increased by installing tile lines to lower the water table in these soils.

Soil fertility.—None of the soils in Ashe County have enough natural fertility to produce economic returns on crops. The soils are naturally acid and, consequently, need additions of lime to make them usable for most crops.

Liming requirements are perhaps the first concern of a farmer because the acidity level in the soil affects the availability to plants of many of the nutrients and the activity of beneficial bacteria. Lime provides calcium (Ca), and when dolomitic lime is used, also magnesium (Mg). The addition of lime neutralizes exchangeable aluminum (Al) and thereby counteracts the adverse effects aluminum has on many important crops grown in the county.

Liming requirements are based upon soil test determinations. In soils that have a sandy surface texture, not only available calcium levels may be low but also magnesium. A guide to use in calcitic or dolomitic liming can be obtained only by soil testing. Also, the desired pH levels differ depending upon the soil properties and the crop to be grown. These differences have been considered in the recommendations available through soil testing.

Nitrogen is required for most crops. Application of nitrogen generally is not required for clover, in some rotations of soybeans, and for alfalfa after it has been established. No soil test is available for predicting nitrogen requirements. Appropriate rates are discussed in the section "Yields Per Acre."

The need for phosphorus and potassium fertilizers can be predicted from soil tests. The requirements for specific crops need to be determined by sampling each field and obtaining the soil test recommendations.

Chemical weed control.—The use of herbicides for weed control in crops is a common practice in Ashe County. Successful use results in less tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates for both of these properties were determined for the soils described in this survey. Table 15 shows a general range of organic matter content for each soil. The surface texture is shown in table 14 in the "USDA texture" column.

Rapid leaching of herbicides may damage young plants or prevent normal seed germination in sandy soils containing less than 2 percent organic matter. The effectiveness of herbicides commonly decreases as the organic matter content exceeds 6 to 10 percent.

For specific herbicide rates, according to the organic matter content and surface texture, read the label before application.

In some cases, the organic matter content of a given soil may range outside that shown in table 15. The higher ranges may occur in soil areas that have received large amounts of animal or manmade waste. The surface layer of soils currently being brought into cultivation may contain higher levels of organic matter than in like soils that have been cultivated for long periods. Conservation tillage may also increase the organic matter content in the surface layer. Lower levels of organic matter are common in soils where the surface layer has been partly or completely removed by erosion, land smoothing, or other activities. Other activities may also affect organic matter content for a given soil. Current soil tests should be used for determination of specific organic matter content.

Pasture Management

Cattle production is the prime source of income for Ashe County. The county has about 34,500 head of cattle and ranks second in the state in the number of cattle on farms. The cattle industry relies mostly on grassland for forage.

Permanent pasture is grown throughout the county on most soils, but the largest acreage is in the central and eastern parts.

The soils in Ashe County can be grouped as follows, according to their suitability for pasture:

- The well drained soils that have slopes of less than 25 percent and are not stony, such as Watauga loam, 8 to 15 percent slopes, and Braddock gravelly loam, 2 to 8 percent slopes, are well suited to most locally grown hay and pasture plants. The erosion hazard is the main limitation.
- Soils such as Ashe gravelly fine sandy loam, 25 to 65 percent slopes, Chandler loam, 25 to 65 percent slopes, and Evard stony loam, 25 to 60 percent slopes, are poorly suited to pasture because they are severely limited by steepness of slope, stoniness, or droughtiness. Where cleared, these soils are mostly in native bluegrass and clover, which yield considerably less than other pasture plants. On these kinds of soil, where pasture cannot be maintained with conventional equipment, many landowners are considering converting to woodland.
- The poorly drained soils on flood plains, such as Toxaway loam, are fairly suited to forage plants that are tolerant of wet soil conditions. If adequately drained, these soils are some of the most productive soils in the county.

Most of the soils in the county are fairly suited to locally grown grasses and legumes, such as tall fescue,

orchardgrass, bluegrass, and white clover. Yields and quality of forage will vary from farm to farm and from one soil to another. On the steeper slopes and in stony areas, the soils are severely limited by the difficulty in establishing and maintaining pasture. Helicopters have been used in the county on a limited basis to distribute lime and phosphate on the steep areas.

Good management practices are needed to produce high yields of quality forage and to reduce soil loss on sloping land.

Fertilizer and lime are needed on most soils in the county because the soils generally are low in fertility, particularly calcium and phosphorus. Fertilizer and lime added to the soil should be in amounts based on the results of soil tests and on the kind of forage and the desired yields. They should be incorporated into a well prepared seedbed before planting. Fertility should be maintained by annual topdressings of fertilizer and lime after the sod has been established. These should be applied just before the main growing season.

Rotational grazing is needed to prevent overgrazing or undergrazing. Grazing closer than 3 inches on most species other than bluegrass greatly reduces forage production. Undergrazing reduces feeding value and encourages diseases and insects. Mowing helps to control uneven growth and weeds and helps keep plants at their most nutritious stage. Pasture renovation should be done in contour strips to reduce soil loss.

Access roads to and through the pasture should be built on the contour to prevent soil loss and guard against the initiation of gullies.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

Maintenance of proper soil reaction and fertility levels should be based on standard soil tests. Nitrogen rates for corn on soils which have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. Where the yield potential is only 100 bushels per acre, then rates of 100 to 120 pounds of nitrogen per acre should be used. Application of nitrogen in excess of that needed to realize potential yields is not usually a sound practice. Excess fertilizer not used by a crop is expensive and may cause pollution. Where corn follows harvested soybeans, nitrogen rates can be reduced 20 to 30 pounds per acre.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Agricultural Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use. (None in Ashe County.)

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use. (None in Ashe County.)

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production. (None in Ashe County.)

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w,* or *s,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w* or *s* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland

Edwin J. Young, state staff forester, Soil Conservation Service, helped with this section.

Forest lands are of economic, social, recreational, and environmental importance to Ashe County. Commercial forest covers 57 percent of the land, or approximately 155,836 acres (*7*). This land is producing or can produce crops of industrial wood and is not withdrawn from timber utilization.

Much of the forested acreage harvested annually in Ashe County received no presale planning for proper logging and skid road location or silvicultural recommendations to insure the future quality and improvement of the forest resource. The lack of a hardwood pulpwood market or other means to utilize low-grade hardwood is a deterrent to good management of hardwood forest. Usually, marketable hardwood sawtimber is harvested, and suppressed culls and less desirable trees occupy the site.

Forested areas also have esthetic value and provide habitat suitable for wildlife.

For the purposes of a forest survey (*8*), three forest types have been identified in the county. They are: *white pine-hemlock* (7,336 acres), which is made up of more than 50 percent stocking of these species and associated birch and maple; *oak-hickory* (132,131 acres), in which upland oaks and hickory make up more than 50 percent of the stocking, and common associates include elm, maple, yellow-poplar, yellow birch, and sweet birch; and *maple-beech-birch* (14,673 acres), in which these trees singly or in combination make up 50 percent of the stocking, and common associates are basswood, white pine, and yellow-poplar.

Site index (*6*) is a measure of soil quality and productivity. White pine, yellow-poplar, and upland oaks are used as key indicator species for determining the site index for most soils in the county.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, and r.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of

slight indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. Site index was determined at 35 years for American sycamore and at age 50 years for all other species. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

Toy N. Campbell, district conservationist, and Edwin J. Young, state staff forester, Soil Conservation Service, helped with this section.

Ashe County offers a variety of recreation opportunities. There are parks and playgrounds, campgrounds, swimming facilities, trails and paths, areas suitable for horseback riding, trout streams, a golf course, and a variety of game for the hunter. The New River provides freshwater fishing, miles of canoeing, and beautiful scenery (fig. 10). In the southern part of the county, the Blue Ridge Parkway offers spectacular scenery for those who wish to travel by motor vehicle. New recreation facilities are constantly being developed, and a knowledge of soils is needed in planning and developing these facilities and in maintaining the existing facilities.

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

J. P. Edwards, wildlife biologist, Soil Conservation Service, helped with this section.

Ashe County has habitat suitable for many kinds of wildlife. Deer, grouse, mourning dove, rabbit, fox, squirrel, chipmunk, opossum, quail, beaver, raccoon,

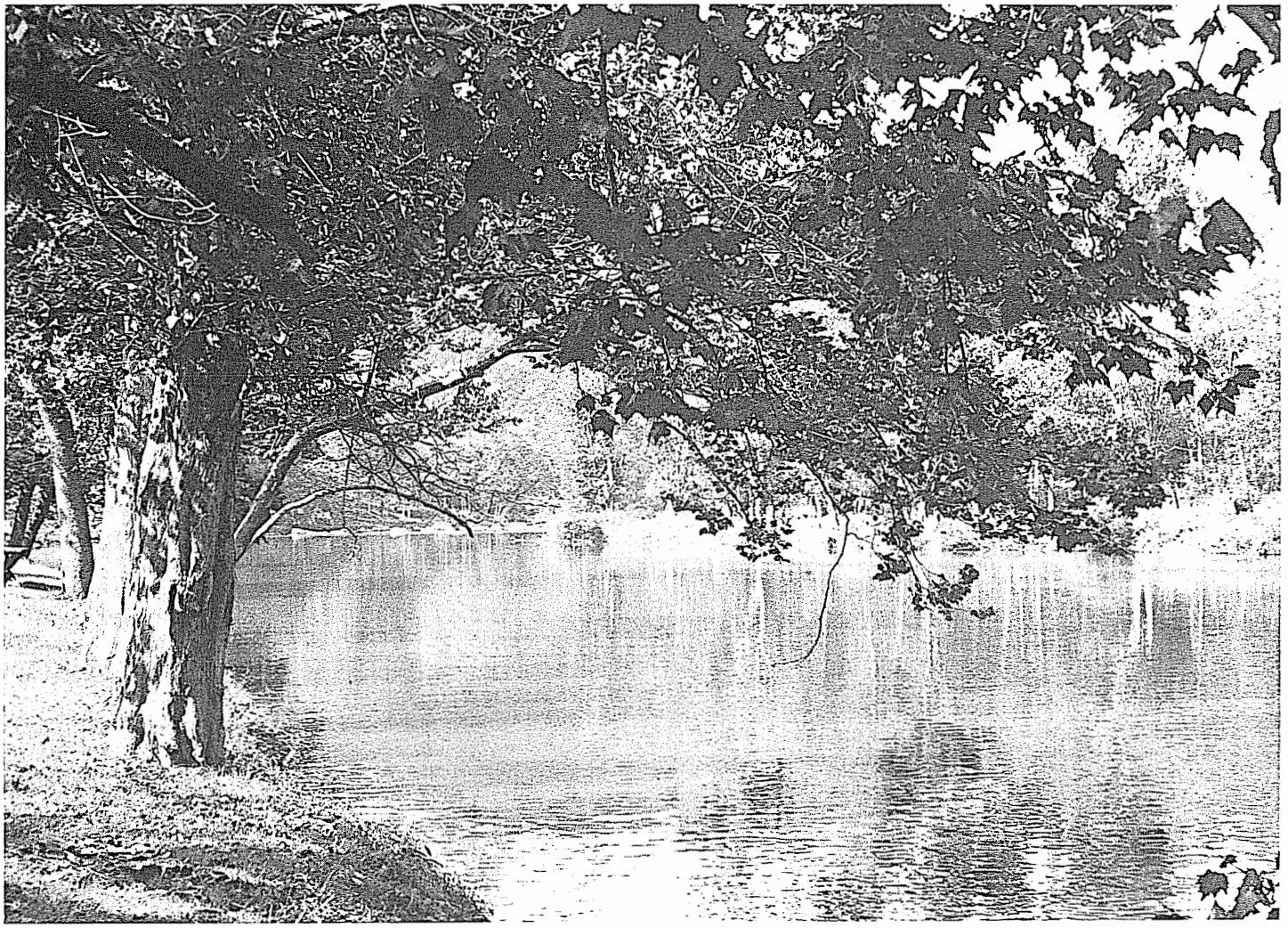

Figure 10.—The New River provides good fishing and canoeing and beautiful scenery.

groundhog, bobcat, numerous nongame birds, and fish are the most important kinds of wildlife in this county.

Improving habitat can increase the abundance of wildlife in the county. Field borders and hedgerows, for example, which are not suitable for cultivation, can provide food and cover for wildlife. The need for habitat management should be considered in planning land use patterns in any particular area.

Management for woodland wildlife habitat and for "edge" habitat would be especially productive. Plantings to increase food supplies and the creation or management of openings to increase edge habitat are particularly effective. Multiple use management of pastureland to encourage wildlife use of these areas would also produce favorable results.

Stream fishery resources would benefit greatly from erosion control practices, such as fencing, which prevents cattle from using the banks, and tree planting to increase the quality of streamside vegetative cover. On critically eroding streambanks, vegetative cover can be established to reduce sediment loads in the stream.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for

various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, and oats.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, lovegrass, bromegrass, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and beaver ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of earthfill and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil

reaction, a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 17.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated *moderate to very high*, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

In table 16, some soils are assigned to two hydrologic groups. Soils that have a seasonal high water table but can be drained are assigned first to a hydrologic group that denotes the drained condition and then to a hydrologic group that denotes the undrained condition; for example, B/D. Because there are different degrees of drainage and water table control, onsite investigation is needed to determine the hydrologic group of the soil in a particular location.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table, the kind of water table, and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons of the Evard and Edneyville soils are typical of the series and are described in the section "Soil Series and Their Morphology." Those of the Clifton and Toxaway soils are not typical of the series. The soil samples were tested by the North Carolina Department of Transportation and Highway Safety, Materials, and Tests Unit.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145-73 (AASHTO); Mechanical analysis—T 88 (AASHTO); Liquid limit—T 89 (AASHTO), Plasticity index—T 90 (AASHTO); Moisture density, Method A—T 99 (AASHTO), and Method C—T 99 (AASHTO).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*9*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, from Udic, meaning not wet but in a humid climate; plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udults*, the suborder of the Ultisols that have a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, micaceous, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*5*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*9*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Ashe Series

The Ashe series consists of somewhat excessively drained soils that formed in residuum of granite and gneiss. These soils are on uplands. Slopes range from 25 to 65 percent.

Typical pedon of Ashe gravelly fine sandy loam, 25 to 65 percent slopes, 2.5 miles northwest of the intersection of N.C. Highway 88 and State Road 1340 on State Road 1340, 2,000 feet northeast of road, near ridgetop:

O—1 inch to 0; partly decomposed hardwood leaves, roots, and mosses.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) gravelly fine sandy loam; weak fine granular structure; very friable; many fine roots; 15 percent by volume pebbles of quartz; strongly acid; clear smooth boundary.
E—3 to 8 inches; brown (10YR 4/3) gravelly fine sandy loam; weak fine granular structure; very friable; common fine roots; 15 percent by volume pebbles of quartz; few fine flakes of mica; strongly acid; clear smooth boundary.
B—8 to 26 inches; yellowish brown (10YR 5/6) loam; weak coarse granular structure; very friable; few medium roots; 5 percent by volume pebbles of quartz and granite gneiss; few fine flakes of mica; strongly acid; gradual wavy boundary.
C—26 to 38 inches; yellowish brown (10YR 5/4) saprolite that crushes to sandy loam; few fine flakes of mica; strongly acid.
R—38 inches; moderately hard granite gneiss.

Ashe soils have a loamy B horizon 10 to 20 inches thick. Reaction is strongly acid or very strongly acid unless the surface layer has been limed.

The A horizon has hue of 10YR or 2.5YR, value of 3 or 4, and chroma of 2 or 3. The A horizons that have value of 3 or less are less than 7 inches thick. The E horizon has chroma and value that are slightly higher than those of the A horizon. In some places there is no E horizon.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. Texture is sandy loam, fine sandy loam, or loam.

The C horizon has colors and textures similar to those of the B horizon.

Braddock Series

The Braddock series consists of well drained soils on stream terraces. These soils formed in alluvium derived from a mixture of crystalline rocks. Slopes range from 2 to 15 percent.

Typical pedon of Braddock gravelly loam, 2 to 8 percent slopes, 1 mile southeast of West Jefferson on State Road 1149, 50 yards south of Ashe County Vocational School, and 300 yards north of Greenfields' Restaurant:

Ap—0 to 8 inches; dark brown (7.5YR 4/4) gravelly loam; moderate medium granular structure; friable; many fine roots; few fine flakes of mica; 20 percent by volume rounded pebbles of quartz 1/2 inch to 2 inches in diameter; medium acid; abrupt smooth boundary.
BA—8 to 15 inches; yellowish red (5YR 4/6) clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; 5 percent by volume rounded pebbles of quartz; clear smooth boundary.
Bt1—15 to 30 inches; yellowish red (5YR 4/6) clay; moderate medium subangular blocky structure; firm; few fine roots; thin continuous clay films on faces of peds; few fine flakes of mica; 5 percent by volume rounded pebbles of quartz; strongly acid; clear smooth boundary.
Bt2—30 to 38 inches; yellowish red (5YR 4/8) clay; weak medium subangular blocky structure; friable; thin continuous clay films on faces of peds; common fine flakes of mica; 5 percent by volume rounded pebbles of quartz; very strongly acid; clear smooth boundary.
BC—38 to 54 inches; yellowish red (5YR 4/8) gravelly loam; weak medium subangular blocky structure; friable; common fine flakes of mica; 15 percent by volume fragments of gneiss and quartz; strongly acid; gradual wavy boundary.
C—54 to 80 inches; yellowish red (5YR 4/6) and strong brown (7.5YR 5/8) saprolite that crushes to sandy loam; friable; strongly acid.

Braddock soils have a clayey Bt horizon 15 to 40 inches thick. The content of coarse fragments ranges from 10 to 25 percent in the A horizon and 0 to 15 percent in the B horizon. Few to common flakes of mica are in the A and B horizons. Reaction is very strongly acid or strongly acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6. The horizons with value of 3 or less are less than 7 inches thick. The E horizon, if present, has chroma and value slightly higher than in the Ap or A horizon.

The BA horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. Texture is clay loam or sandy clay loam. In places there is no BA horizon. The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. Texture is clay loam, sandy clay, or clay. The BC horizon has colors similar to those of the Bt horizon, or it is mottled in shades of those colors. Texture is loam, sandy loam, or sandy clay loam, or their gravelly analogues.

The C horizon is mottled yellowish red, red, or strong brown saprolite that crushes to sandy loam or loam.

Chandler Series

The Chandler series consists of somewhat excessively drained, micaceous soils that formed in residuum of mica schist or mica gneiss. These soils are on uplands. Slopes range from 25 to 65 percent.

Typical pedon of Chandler loam, 25 to 65 percent slopes, 3.2 miles east of Jefferson on N.C. Highway 16, 0.5 mile east on State Road 1585, 20 feet south of road:

Ap1—0 to 2 inches; dark brown (10YR 3/3) loam; weak medium granular structure; very friable; common fine

roots; common fine flakes of mica; 5 percent by volume fragments of quartz; medium acid; clear smooth boundary.
Ap2—2 to 8 inches; brown (10YR 4/3) loam; weak medium granular structure; very friable; common fine roots; common fine flakes of mica; strongly acid; clear smooth boundary.
B—8 to 30 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; many fine flakes of mica; 5 percent by volume fragments of weathered mica schist; strongly acid; gradual wavy boundary.
C—30 to 80 inches; strong brown (7.5YR 5/6) and brown (10YR 5/3) saprolite of mica schist that crushes to fine sandy loam; many fine flakes of mica; strongly acid.

Chandler soils have a loamy B horizon 16 to 31 inches thick. Reaction is very strongly acid or strongly acid throughout, except where the surface layer has been limed. Mica content ranges from common to many in the A horizon and is many in the B and C horizons.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. The A horizon, where present, has chroma and value slightly higher than in the Ap or A1 horizon. The horizons with value of 3 or less are less than 7 inches thick.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. Texture is loam or sandy loam.

The C horizon has colors similar to those of the B horizon. It is saprolite of mica schist or mica gneiss that crushes to fine sandy loam or loam.

Clifton Series

The Clifton series consists of well drained soils, which formed in residuum of gneiss and schist. These soils are on uplands. Slopes range from 2 to 25 percent.

Typical pedon of Clifton loam, 2 to 8 percent slopes, 9 miles southeast of Jefferson on N.C. Highway 88, 1,000 yards north of Ebenezer Church on State Road 1623, 20 feet west of road:

Ap—0 to 5 inches; brown (7.5YR 4/4) loam; weak medium granular structure; very friable; common fine roots; many fine pores; few fine flakes of mica; few fine pebbles; strongly acid; clear smooth boundary.
BA—5 to 10 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.
Bt1—10 to 23 inches; red (2.5YR 5/6) clay; moderate medium subangular blocky structure; friable; thin continuous clay films on faces of peds; few fine flakes of mica; strongly acid; clear smooth boundary.
Bt2—23 to 38 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; thin continuous clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.
BC—38 to 45 inches; red (2.5YR 4/6) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine flakes of mica; strongly acid; gradual wavy boundary.
C—45 to 65 inches; yellowish red (5YR 5/6) and strong brown (7.5YR 5/8) saprolite that crushes to fine sandy loam; common fine flakes of mica; strongly acid.

Clifton soils have a clayey Bt horizon 15 to 45 inches thick. The content of coarse fragments ranges from 0 to 35 percent in the A horizon and 0 to 15 percent in the B and C horizons. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

The Ap or A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. The E horizon, if present, has value and chroma slightly higher than those of the Ap or A1 horizon. The horizons with value of 3 or less are less than 7 inches thick.

The BA horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. Texture is loam, clay loam, or sandy clay loam. In some places there is no BA horizon. The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. Texture is clay loam or clay. The BC horizon is similar in color to the Bt horizon, and its texture is sandy clay loam or clay loam. In some places there is no BC horizon.

The C horizon is mottled saprolite that crushes to loam or fine sandy loam.

Colvard Series

The Colvard series consists of well drained soils that formed in recent alluvium. These soils are on flood plains. Slopes range from 0 to 4 percent.

Typical pedon of Colvard fine sandy loam, 9 miles east of Jefferson on N.C. Highway 221, 2 miles west of Scottsville on N.C. Highway 221, 450 yards south of N.C. Highway 221, 100 yards east of New River:

Ap—0 to 10 inches; dark brown (10YR 4/3) fine sandy loam; weak medium granular structure; very friable; common fine roots; few fine flakes of mica; medium acid; abrupt smooth boundary.
C1—10 to 26 inches; brown (7.5YR 4/4) fine sandy loam; weak medium granular structure; very friable; few fine roots; common fine flakes of mica; slightly acid; clear smooth boundary.
C2—26 to 42 inches; yellowish brown (10YR 5/6) fine sandy loam; massive; very friable; few fine roots; common fine flakes of mica; few fine lenses of dark gray sand; neutral; clear smooth boundary.

C3—42 to 47 inches; yellowish brown (10YR 5/4) loamy sand; massive; very friable; common fine flakes of mica; slightly acid; gradual wavy boundary.
2C4—47 to 60 inches; brown (10YR 5/3) cobbly sand; single grained; loose; few fine flakes of mica; 15 percent by volume rounded cobbles of quartz; few thin strata of sandy loam; slightly acid.

The Colvard soils have loamy horizons 40 to 60 inches or more thick over deposits of stratified sandy, loamy, gravelly, or cobbly sediments. The content of coarse fragments ranges from 0 to 15 percent. Flakes of mica range from few to common. Reaction is strongly acid through mildly alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. The horizons with value of 3 or less are less than 7 inches thick.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. Texture is sandy loam, fine sandy loam, loamy sand, or loam with thin strata of loamy sand or sand.

The 2C horizon has colors similar to those of the C horizon. It consists of stratified sandy, loamy, cobbly, or gravelly sediments. In some places there is no 2C horizon.

Edneyville Series

The Edneyville series consists of well drained soils that formed in residuum of gneiss and granite. These soils are on uplands. Slopes range from 15 to 45 percent.

Typical pedon of Edneyville loam, 25 to 45 percent slopes, 1 mile southwest of Grayson on State Road 1325, 1,000 feet southeast of the junction of State Road 1325 and State Road 1389:

Ap—0 to 8 inches; dark brown (10YR 4/3) loam; moderate medium granular structure; very friable; many fine roots; 5 percent by volume fragments of gneiss; strongly acid; abrupt smooth boundary.
Bt1—8 to 12 inches; brown (7.5YR 5/4) loam; weak fine and medium subangular blocky structure; friable; few fine roots; many fine pores; thin discontinuous clay films on faces of peds; 5 percent by volume fragments of gneiss; strongly acid; clear smooth boundary.
Bt2—12 to 22 inches; strong brown (7.5YR 5/6) loam; weak fine and medium subangular blocky structure; friable; few fine roots; many fine pores; thin discontinuous clay films on faces of peds; 5 percent by volume fragments of gneiss; very strongly acid; clear smooth boundary.
BC—22 to 28 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable; many fine pores; 10 percent by volume fragments of gneiss; very strongly acid; gradual wavy boundary.
C—28 to 62 inches; dark yellowish brown (10YR 4/4) and dark gray (10YR 4/1) saprolite that crushes to fine sandy loam; massive; friable; strongly acid.

Edneyville soils have a loamy B horizon 15 to 30 inches thick. Reaction is very strongly acid or strongly acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. The horizons with value of 3 or less are less than 7 inches thick.

The BA horizon, if present, has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. Texture is loam, sandy loam, or fine sandy loam. The Bt horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8. Texture is loam or sandy clay loam. The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. Texture is loam, sandy loam, or fine sandy loam. In some places there is no BC horizon.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 1 through 6. It is saprolite that crushes to loam or fine sandy loam.

Evard Series

The Evard series consists of well drained soils that formed in residuum of granite and gneiss. These soils are on uplands. Slopes range from 15 to 60 percent.

Typical pedon of Evard loam, 25 to 45 percent slopes, 9 miles northeast of Jefferson on N.C. Highway 16, 0.3 mile south of Pleasant Home Church, and 100 feet west of N.C. Highway 16:

Ap—0 to 7 inches; brown (7.5YR 4/4) loam; moderate medium and fine granular structure; friable; many fine roots; few fine flakes of mica; few fragments of quartz; strongly acid; clear smooth boundary.
Bt1—7 to 12 inches; strong brown (7.5YR 5/6) clay loam; weak medium subangular blocky structure; friable; common fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; 5 percent by volume fragments of quartz; strongly acid; gradual smooth boundary.
Bt2—12 to 32 inches; yellowish red (5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; 5 percent by volume fragments of quartz; strongly acid; clear smooth boundary.
BC—32 to 36 inches; yellowish red (5YR 4/6) sandy loam; few fine faint strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine flakes of mica; 10 percent by volume fragments of quartz; strongly acid; clear smooth boundary.

C—36 to 90 inches; mottled yellowish red (5YR 5/6) and strong brown (7.5YR 5/6) saprolite that crushes to sandy loam; many fine flakes of mica; strongly acid.

Evard soils have a loamy Bt horizon 12 to 28 inches thick. The content of quartz fragments ranges from 0 to 15 percent by volume throughout the soil. Few to common flakes of mica are throughout. Reaction is very strongly acid or strongly acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. The E horizon, where present, has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

The BA horizon, where present, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, sandy loam, or sandy clay loam. The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. Texture is sandy clay loam or clay loam. The BC horizon has hue of 5YR, value of 4 to 6, and chroma of 6 to 8. Texture is loam, sandy loam, or sandy clay loam. In places there is no BC horizon.

The C horizon has colors similar to those of the B horizon and is saprolite that crushes to sandy loam or loam.

Fannin Series

The Fannin series consists of well drained, micaceous soils that formed in residuum of mica schist and mica gneiss. These soils are on uplands. Slopes range from 8 to 25 percent.

Typical pedon of Fannin loam, 8 to 15 percent slopes, 2 miles east of Jefferson on N.C. Highway 16, 0.6 mile east of N.C. Highway 16, 200 yards west of South Fork of New River:

Ap—0 to 5 inches; brown (7.5YR 4/4) loam; weak fine granular structure; very friable; many fine roots; common fine flakes of mica; medium acid; abrupt smooth boundary.

Bt—5 to 21 inches; yellowish red (5YR 5/6) clay loam; weak medium subangular blocky structure; friable; few fine roots; thin discontinuous clay films on vertical faces of peds; many fine flakes of mica; strongly acid; clear wavy boundary.

BC—21 to 35 inches; yellowish red (5YR 5/8) loam; weak medium subangular blocky structure; friable; many fine flakes of mica; few fine dark streaks; strongly acid; gradual wavy boundary.

C—35 to 72 inches; yellowish red (5YR 5/6) saprolite that crushes to loam; massive; friable; many fine flakes of mica; few fine dark streaks; very strongly acid.

Fannin soils have a loamy Bt horizon 12 to 20 inches thick over micaceous loamy saprolite. Reaction is very strongly acid or strongly acid throughout, except where the surface layer has been limed. Mica content ranges from common to many throughout the soil.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. The E horizon, where present, has value and chroma slightly higher than the Ap or A horizon. The horizons with value of 3 or less are less than 7 inches thick.

The BA horizon, where present, has hue of 5YR, value of 4 or 5, and chroma of 4 to 6. Texture is clay loam or loam. The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. Texture is clay loam. The BC horizon has color and texture similar to those of the Bt horizon. In some places there is no BC horizon.

The C horizon is red and brown saprolite that crushes to loam or fine sandy loam.

Porters Series

The Porters series consists of well drained soils, which are on uplands and formed in residuum of dark gneiss. Slopes range from 15 to 65 percent.

Typical pedon of Porters stony loam, 25 to 65 percent slopes, 3 miles northwest of Todd on Old Field Ball Mountain, 2 feet east of private road:

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) stony loam; moderate medium granular structure; very friable; many fine roots; 20 percent by volume pebbles and stones of dark gneiss and quartz; strongly acid; clear smooth boundary.

A2—7 to 11 inches; dark brown (10YR 3/3) stony loam; weak medium granular structure; very friable; common fine roots; 20 percent by volume pebbles and stones of dark gneiss and quartz; strongly acid; clear smooth boundary.

BA—11 to 18 inches; brown (7.5YR 5/4) stony loam; weak medium subangular blocky structure; friable; few fine roots; 25 percent by volume pebbles and stones of dark gneiss and quartz; medium acid; clear smooth boundary.

Bt—18 to 30 inches; strong brown (7.5YR 5/6) stony loam; weak fine subangular blocky structure; friable; thin discontinuous clay films on faces of peds and around stones; 20 percent by volume pebbles and stones of dark gneiss; medium acid; clear smooth boundary.

BC—30 to 35 inches; brown (7.5YR 4/4) stony loam; weak medium subangular blocky structure; friable; 35 percent by volume pebbles and stones of dark gneiss; medium acid; gradual wavy boundary.

C—35 to 42 inches; mottled yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) saprolite that crushes to loam; 60 percent by volume pebbles and stones of dark gneiss; medium acid.

R—42 inches; dark gneiss bedrock.

Porters soils have a loamy Bt horizon 10 to 20 inches thick over saprolite that crushes to loam. Pebbles and stones make up 10 to 35 percent of the volume throughout the soil. Reaction is strongly acid or medium acid throughout unless the surface layer has been limed.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 to 4.

The BA horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. Texture is loam or fine sandy loam, or their stony analogues. In some places there is no BA horizon. The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 8. Texture is loam, sandy clay loam, or clay loam, or their stony analogues. The BC horizon has colors and textures similar to those of the Bt horizon. In some places there is no BC horizon.

The C horizon is similar in color to the B horizon and is saprolite that crushes to loam or fine sandy loam.

Spivey Series

The Spivey series consists of well drained soils on uplands. These soils formed in colluvium and local alluvium. Slopes range from 15 to 45 percent.

Typical pedon of Spivey very stony loam, 15 to 25 percent slopes, in an area of Tusquitee and Spivey stony soils, 15 to 25 percent slopes, 0.5 mile east of Jefferson on N.C. Highway 88, 500 yards south of N.C. Highway 88, 10 feet west of old Luther Road:

A1—0 to 12 inches; dark brown (10YR 3/3) very stony loam; weak fine granular structure; very friable; many fine roots; few fine flakes of mica; 60 percent by volume rounded cobbles of gneiss and quartz up to 15 inches across; strongly acid; clear smooth boundary.

A2—12 to 18 inches; dark brown (10YR 4/3) very stony loam; weak medium granular structure; very friable; many fine roots; few fine flakes of mica; 40 percent by volume rounded cobbles of gneiss and quartz up to 15 inches across; strongly acid; clear smooth boundary.

B—18 to 35 inches; dark yellowish brown (10YR 4/4) very stony loam; weak medium subangular blocky structure; friable; few fine flakes of mica; 40 percent by volume rounded cobbles of gneiss and quartz up to 24 inches across; strongly acid; clear smooth boundary.

BC—35 to 48 inches; dark brown (10YR 4/3) very stony loam; weak medium subangular blocky structure; friable; 60 percent by volume rounded cobbles of gneiss and quartz up to 24 inches across; strongly acid; clear smooth boundary.

C—48 to 60 inches; yellowish brown (10YR 5/6) very stony fine sandy loam; massive; friable; 60 percent by volume rounded, dark colored cobbles of gneiss up to 48 inches across; strongly acid.

The Spivey soils have a loamy B horizon 20 to 50 inches thick over unconsolidated colluvium. Cobbles or fragments of gneiss and quartz make up 40 to 60 percent of the volume throughout the soil. These soils are very strongly acid or strongly acid, except where the surface layer has been limed.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 2 or 3.

The B and C horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. Texture is stony or very stony loam or stony or very stony fine sandy loam.

Toxaway Series

The Toxaway series consists of poorly drained and very poorly drained soils on flood plains. These soils formed in recent loamy alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Toxaway loam, 0 to 2 percent slopes, 10 miles east of Jefferson on N.C. Highway 88, 0.4 mile southwest of Transou Church, 100 yards north of N.C. Highway 88 and 25 yards southwest of Peak Creek:

Ap—0 to 12 inches; very dark gray (10YR 3/1) loam; moderate medium granular structure; very friable; common fine roots; common fine flakes of mica; slightly acid; clear smooth boundary.

A1—12 to 25 inches; very dark gray (10YR 3/1) loam; few fine distinct brown (10YR 5/3) mottles; weak medium granular structure; friable; few fine roots; common fine flakes of mica; medium acid; clear smooth boundary.

Cg1—25 to 32 inches; dark gray (10YR 4/1) loam; massive; friable; few fine dead roots and root channels; common fine flakes of mica; medium acid; clear smooth boundary.

Cg2—32 to 42 inches; dark gray (10YR 4/1) loam; common coarse distinct grayish brown (10YR 5/2) mottles; massive; friable; common fine flakes of mica; medium acid; clear smooth boundary.

Cg3—42 to 58 inches; dark gray (10YR 4/1) fine sandy loam; massive; friable; common fine flakes of mica; common fine lenses of sand; strongly acid; abrupt smooth boundary.

2Cg—58 to 72 inches; grayish brown (10YR 5/2) gravelly coarse sand; single grained; loose; 20 percent by volume rounded quartz gravel and cobbles; strongly acid.

Toxaway soils have loamy horizons 40 to 60 inches thick. These soils are strongly acid or medium acid, except where the surface layer has been limed.

The A horizon has hue of 10YR or has no hue; value is 2 or 3, and chroma is 0 to 2.

The upper part of the C horizon has hue of 10YR or 2.5Y, or it has no hue; value is 3 to 6, and chroma is 0 to 2. Texture is loam, silt loam, sandy clay loam, sandy

loam, or fine sandy loam. The 2C horizon is stratified layers of sand and gravel.

Tusquitee Series

The Tusquitee series consists of well drained soils that formed in colluvium. These soils are on uplands. Slopes range from 8 to 45 percent.

Typical pedon of Tusquitee loam, 8 to 15 percent slopes, 0.6 mile east of Clifton on N.C. Highway 88, 0.3 mile south of junction of N.C. Highway 88 and State Road 1128 on State Road 1128, 200 yards southeast of state road:

Ap—0 to 10 inches; dark brown (10YR 3/3) loam; weak medium granular structure; very friable; many fine and medium roots; 5 percent by volume rounded cobbles of gneiss and quartz; medium acid; clear smooth boundary.

BA—10 to 18 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; 5 percent by volume rounded cobbles of gneiss and quartz; strongly acid; clear smooth boundary.

Bt—18 to 42 inches; strong brown (7.5YR 5/6) clay loam; weak medium subangular blocky structure; friable; few fine and medium roots; few fine flakes of mica; 5 percent by volume rounded cobbles of gneiss and quartz; thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

BC—42 to 56 inches; strong brown (7.5YR 5/6) loam; common fine distinct dark brown (7.5YR 3/2) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; 10 percent by volume cobbles of gneiss and quartz; strongly acid; gradual wavy boundary.

2C—56 to 60 inches; mottled yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) cobbly fine sandy loam; massive; 30 percent by volume cobbles of gneiss and quartz; strongly acid.

Tusquitee soils have a loamy Bt horizon 20 to 40 inches thick. The content of coarse fragments ranges from 0 to 15 percent by volume in the B horizon and 15 to 50 percent in the C horizon. Reaction is strongly acid or medium acid throughout, except where the surface has been limed.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 2 to 4.

The BA horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6, and loam texture. In some places there is no BA horizon. The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. Texture is clay loam or sandy clay loam. The BC horizon has colors and textures similar to those of the Bt horizon. In some places there is no BC horizon.

The C horizon has colors similar to those of the B horizon. It is unconsolidated loamy material.

Watauga Series

The Watauga series consists of well drained, micaceous soils that formed in residuum of mica schist or mica gneiss. These soils are on uplands. Slopes range from 8 to 45 percent.

Typical pedon of Watauga loam, 15 to 25 percent slopes, 10 miles east of Jefferson on N.C. Highway 88, 600 yards southeast of Transou Church on Upper Mountain Agricultural Research Service Center at the end of field road, 60 yards west of woods:

Ap—0 to 5 inches; brown (10YR 4/3) loam; weak medium granular structure; very friable; many fine roots; common fine pores and worm channels; common fine flakes of mica; 5 percent by volume pebbles of quartz; slightly acid; abrupt smooth boundary.

BA—5 to 9 inches; brown (7.5YR 5/4) loam; weak medium subangular blocky structure; friable; few fine roots; common fine pores and worm channels filled with brown (10YR 4/3) material; common fine flakes of mica; 5 percent by volume pebbles of quartz; strongly acid; clear smooth boundary.

Bt—9 to 21 inches; strong brown (7.5YR 5/8) loam; weak fine and medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; many fine flakes of mica; 5 percent by volume pebbles of quartz and weathered mica schist fragments; strongly acid; clear smooth boundary.

BC—21 to 33 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; many fine flakes of mica; 10 percent by volume mica schist saprolite; strongly acid; gradual wavy boundary.

C—33 to 72 inches; pale brown (10YR 6/3) saprolite that crushes to loam; common medium distinct strong brown (7.5YR 5/6) mottles and few dark brown streaks; many fine flakes of mica; very strongly acid.

Watauga soils have a loamy Bt horizon 10 to 35 inches thick. Reaction is very strongly acid to medium acid throughout, except where the surface layer has been limed. Mica content ranges from common to many in the A horizon and in the upper part of the B horizon and is many in the lower part of the B and in the C horizons.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. The E horizon, where present, has chroma and value slightly higher than those of the Ap or A horizon. The E horizons with values of 3 or less are less than 7 inches thick.

The BA horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6 and texture of loam or fine sandy loam. In places there is no BA horizon. The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and

chroma of 4 to 8. Texture is clay loam, loam, or sandy clay loam. The BC horizon has colors similar to those of the Bt horizon and is loam or fine sandy loam. In places there is no BC horizon.

The C horizon is similar in color to the B horizon. It consists of saprolite of mica schist or mica gneiss that crushes to loam or fine sandy loam.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Edge habitat. The zone of transition from one type of plant cover to another.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when

light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of another horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 or E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These

changes result in disintegration and decomposition of the material.

Wetness. A general term for soils that have a seasonal high water table.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-78 at Transou, N.C.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	42.8	21.8	32.3	64	-5	0	3.70	2.18	5.04	8	7.1
February---	45.9	23.7	34.8	67	-2	11	4.34	2.16	6.22	7	6.6
March------	53.3	29.7	41.5	73	7	41	5.61	3.44	7.56	9	5.2
April------	64.0	38.1	51.1	80	18	87	4.34	2.80	5.73	8	.2
May--------	71.1	45.9	58.5	83	26	273	4.47	2.66	6.07	9	.0
June-------	76.7	52.7	64.7	88	33	441	4.29	2.22	6.08	8	.0
July-------	79.7	56.6	68.2	89	40	564	4.60	3.00	6.04	9	.0
August-----	78.8	56.0	67.4	88	39	539	5.23	2.71	7.42	9	.0
September--	73.2	49.7	61.5	84	29	345	4.44	1.81	6.66	6	.0
October----	64.0	38.1	51.1	79	17	89	4.09	1.72	6.08	6	.2
November---	53.5	30.4	41.9	72	8	6	4.12	2.18	5.81	7	.7
December---	45.0	24.1	34.5	66	-1	8	4.01	2.08	5.69	7	4.4
Year-----	62.3	38.9	50.6	90	-6	2,404	53.24	45.54	60.18	93	24.4

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-78 at Transou, N.C.]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 28	May 17	June 3
2 years in 10 later than--	April 23	May 12	May 27
5 years in 10 later than--	April 13	May 1	May 14
First freezing temperature in fall:			
1 year in 10 earlier than--	October 4	September 27	September 17
2 years in 10 earlier than--	October 9	October 1	September 21
5 years in 10 earlier than--	October 20	October 8	September 30

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-78 at Transou, N.C.]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	173	142	117
8 years in 10	179	148	125
5 years in 10	189	160	138
2 years in 10	199	171	152
1 year in 10	205	178	159

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AHF	Ashe gravelly fine sandy loam, 25 to 65 percent slopes	7,565	2.8
BrB	Braddock gravelly loam, 2 to 8 percent slopes	1,191	0.4
BrD	Braddock gravelly loam, 8 to 15 percent slopes	4,213	1.5
BuC	Braddock-Urban land complex, 2 to 15 percent slopes	120	*
CaF	Chandler loam, 25 to 65 percent slopes	10,873	4.0
CfB	Clifton loam, 2 to 8 percent slopes	639	0.2
CfD	Clifton loam, 8 to 15 percent slopes	8,147	3.0
CfE	Clifton loam, 15 to 25 percent slopes	5,971	2.2
Co	Colvard fine sandy loam	4,294	1.6
EdE	Edneyville loam, 15 to 25 percent slopes	8,879	3.3
EdF	Edneyville loam, 25 to 45 percent slopes	51,334	18.8
EsF	Evard stony loam, 25 to 60 percent slopes	13,775	5.0
EvE	Evard loam, 15 to 25 percent slopes	17,745	6.5
EvF	Evard loam, 25 to 45 percent slopes	22,950	8.4
FnD	Fannin loam, 8 to 15 percent slopes	3,710	1.4
FnE	Fannin loam, 15 to 25 percent slopes	4,570	1.7
Pd	Pits-Dumps complex	100	*
PsE	Porters stony loam, 15 to 25 percent slopes	2,935	1.1
PsF	Porters stony loam, 25 to 65 percent slopes	27,759	10.2
To	Toxaway loam	6,960	2.5
TsD	Tusquitee loam, 8 to 15 percent slopes	7,158	2.6
TsE	Tusquitee loam, 15 to 25 percent slopes	1,830	0.7
TUE	Tusquitee and Spivey stony soils, 15 to 25 percent slopes	9,182	3.4
TUF	Tusquitee and Spivey stony soils, 25 to 45 percent slopes	1,912	0.7
WaD	Watauga loam, 8 to 15 percent slopes	3,850	1.4
WaE	Watauga loam, 15 to 25 percent slopes	17,300	6.3
WaF	Watauga loam, 25 to 45 percent slopes	27,105	9.9
	Water	1,213	0.4
	Total	273,280	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Corn	Corn silage	Cabbage	Snap beans	Tobacco	Grass-legume hay	Pasture
	Bu	Ton	Cwt	Bu	Lb	Ton	AUM*
AHF---------- Ashe	---	---	---	---	---	1.0	2.5
BrB, BrD---------- Braddock	110	26	300	325	3,000	2.5	6.0
BuC---------- Braddock-Urban land	---	---	---	---	---	---	---
CaF---------- Chandler	---	---	---	---	---	1.0	3.5
CfB---------- Clifton	100	25	300	300	2,800	2.5	5.0
CfD---------- Clifton	80	22	300	275	2,500	2.0	4.5
CfE---------- Clifton	70	20	---	---	2,000	2.0	4.0
Co---------- Colvard	125	30	350	350	---	3.0	6.0
EdE, EdF---------- Edneyville	---	---	---	---	2,000	2.0	4.5
EsF---------- Evard	---	---	---	---	---	---	3.0
EvE---------- Evard	---	---	---	---	---	---	5.0
EvF---------- Evard	---	---	---	---	---	---	4.5
FnD---------- Fannin	80	23	250	275	2,500	2.5	5.0
FnE---------- Fannin	---	---	---	---	2,000	2.0	4.0
Pd---------- Pits-Dumps	---	---	---	---	---	---	---
PsE---------- Porters	---	---	---	---	---	---	5.0
PsF---------- Porters	---	---	---	---	---	---	4.0
To---------- Toxaway	---	---	---	---	---	2.0	5.5
TsD---------- Tusquitee	90	---	---	---	2,400	3.5	---
TsE---------- Tusquitee	100	---	350	350	3,300	3.0	6.0
TUE---------- Tusquitee and Spivey	90	---	350	325	3,000	2.5	5.0

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Corn	Corn silage	Cabbage	Snap beans	Tobacco	Grass-legume hay	Pasture
	Bu	Tons	Cwt	Bu	Lb	Tons	AUM*
TUF---------- Tusquitee and Spivey	---	---	---	---	---	---	---
WaD---------- Watauga	80	23	325	300	2,600	2.5	5.0
WaE---------- Watauga	70	20	300	---	2,000	2.0	4.5
WaF---------- Watauga	---	---	---	---	---	2.0	4.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	---	---	---	---
II	4,294	---	4,294	---
III	1,830	1,830	---	---
IV	33,143	23,248	6,960	2,935
V	---	---	---	---
VI	106,769	106,769	---	---
VII	125,691	114,597	---	11,094
VIII	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
AHF* Ashe	3r	Severe	Severe	Moderate	Chestnut oak Scarlet oak Yellow-poplar Eastern white pine Northern red oak	--- --- 78 84 ---	Eastern white pine, Fraser fir, Scotch pine, Norway spruce.
BrB, BrD Braddock	2c	Slight	Moderate	Slight	Northern red oak Yellow-poplar Eastern white pine	80 90 95	Yellow-poplar, eastern white pine.
CaF Chandler	3r	Severe	Severe	Slight	Chestnut oak Scarlet oak Southern red oak Hickory Northern red oak Yellow-poplar Eastern white pine	67 70 68 81 80 --- 81	Eastern white pine, Scotch pine.
CfB, CfD Clifton	2o	Slight	Slight	Slight	Eastern white pine Northern red oak Yellow-poplar	93 --- 93	Eastern white pine, Fraser fir, northern red oak, yellow-poplar, Scotch pine, Norway spruce, black walnut.
CfE Clifton	2r	Moderate	Moderate	Slight	Eastern white pine Northern red oak Yellow-poplar	93 --- 93	Eastern white pine, Fraser fir, northern red oak, yellow-poplar, Scotch pine, Norway spruce, black walnut.
Co Colvard	1o	Slight	Slight	Slight	Yellow-poplar Northern red oak Black oak White oak Black walnut Eastern white pine American sycamore	102 --- --- --- --- 96 ---	Eastern white pine, black walnut, yellow-poplar.
EdE, EdF Edneyville	2r	Slight	Moderate	Moderate	Eastern white pine Northern red oak Yellow-poplar	92 75 95	Fraser fir, Scotch pine, Norway spruce, eastern white pine, yellow-poplar.
EsF, EvE, EvF Evard	2r	Moderate	Moderate	Moderate	Eastern white pine Yellow-poplar	80 90	Eastern white pine, yellow-poplar.
FnD Fannin	2o	Slight	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine	68 86 89	Eastern white pine, yellow-poplar, Norway spruce, Fraser fir, Scotch pine.
FnE Fannin	2r	Moderate	Moderate	Slight	Northern red oak Yellow-poplar Eastern white pine	68 86 89	Eastern white pine, yellow-poplar, Norway spruce, Fraser fir, Scotch pine.
PsE Porters	2r	Slight	Slight	Slight	Northern red oak Yellow-poplar	76 95	Yellow-poplar, black walnut, Fraser fir, Scotch pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
PsF Porters	2r	Severe	Moderate	Slight	Northern red oak Yellow-poplar	76 95	Yellow-poplar, black walnut, Fraser fir, Scotch pine.
To Toxaway	2w	Slight	Severe	Severe	Virginia pine Eastern white pine Northern red oak Yellow-poplar	--- 93 --- 93	Green ash, white ash, northern red oak, yellow-poplar, Scotch pine, eastern white pine, American sycamore.
TsD Tusquitee	2o	Slight	Slight	Slight	Eastern white pine Northern red oak Yellow-poplar White oak Hickory Black locust Black walnut	90 80 95 --- --- --- ---	Fraser fir, Scotch pine, Norway spruce, northern red oak, eastern white pine, black walnut, yellow-poplar.
TsE Tusquitee	2r	Moderate	Moderate	Slight	Eastern white pine Northern red oak Yellow-poplar White oak Hickory Black locust Black walnut	90 80 95 --- --- --- ---	Fraser fir, Scotch pine, Norway spruce, northern red oak, eastern white pine, black walnut, yellow-poplar.
TUE*: Tusquitee	2x	Slight	Moderate	Slight	Eastern white pine Northern red oak Yellow-poplar White oak Hickory Black locust Black walnut	90 80 95 --- --- --- ---	Fraser fir, Scotch pine, Norway spruce.
Spivey	2x	Moderate	Severe	Moderate	Yellow-poplar Northern red oak Eastern white pine	100 80 90	Yellow-poplar, eastern white pine.
TUF*: Tusquitee	2x	Moderate	Moderate	Moderate	Eastern white pine Northern red oak Yellow-poplar White oak Hickory Black locust Black walnut	90 80 95 --- --- --- ---	Fraser fir, Scotch pine, Norway spruce.
Spivey	2x	Moderate	Severe	Moderate	Yellow-poplar Northern red oak Eastern white pine	100 80 90	Yellow-poplar, eastern white pine.
WaD Watauga	2o	Slight	Slight	Slight	White oak Yellow-poplar Hickory Eastern white pine Northern red oak	--- 94 --- 86 ---	Eastern white pine, black walnut, yellow-poplar, northern red oak, Fraser fir.
WaE, WaF Watauga	2r	Moderate	Moderate	Slight	White oak Yellow-poplar Hickory Eastern white pine Northern red oak	--- 94 --- 86 ---	Eastern white pine, black walnut, yellow-poplar, northern red oak, Fraser fir.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AHF* Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BrB Braddock	Slight	Slight	Severe: small stones.	Slight	Moderate: large stones.
BrD Braddock	Moderate: slope.	Moderate: slope.	Severe: slope, small stones.	Slight	Moderate: slope, large stones.
BuC*: Braddock	Moderate: slope.	Moderate: slope.	Severe: slope, small stones.	Slight	Moderate: slope, large stones.
Urban land.					
CaF Chandler	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CfB Clifton	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones.
CfD Clifton	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
CfE Clifton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Co Colvard	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: droughty, flooding.
EdE Edneyville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
EdF Edneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EsF Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, large stones.
EvE Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
EvF Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
FnD Fannin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
FnE Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Pd*: Pits.					

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pd*: Dumps.					
PsE--- Porters	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PsF--- Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
To--- Toxaway	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
TsD--- Tusquitee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight---	Moderate: slope.
TsE--- Tusquitee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
TUE*: Tusquitee---	Severe: large stones, slope.	Severe: slope.	Severe: slope.	Moderate: large stones, slope.	Severe: large stones, slope.
Spivey---	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope.
TUF*: Tusquitee---	Severe: large stones, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Spivey---	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope.
WaD--- Watauga	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight---	Moderate: large stones, slope.
WaE--- Watauga	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
WaF--- Watauga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AHF*---- Ashe	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BrB---- Braddock	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BrD---- Braddock	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BuC*: Braddock----	---	---	---	---	---	---	---	--	---	---
Urban land.										
CaF---- Chandler	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CfB---- Clifton	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CfD---- Clifton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CfE---- Clifton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Co---- Colvard	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Poor.
EdE---- Edneyville	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EdF---- Edneyville	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
EsF---- Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
EvE---- Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
EvF---- Evard	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
FnD---- Fannin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FnE---- Fannin	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Pd*: Pits.										
Dumps.										
PsE---- Porters	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PsF---- Porters	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
To---------- Toxaway	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
TsD---------- Tusquitee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TsE---------- Tusquitee	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
TUE*:										
Tusquitee----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Spivey----------	Very poor.	Very poor.	Fair	Good	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
TUF*:										
Tusquitee----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Spivey----------	Very poor.	Very poor.	Fair	Good	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
WaD---------- Watauga	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WaE---------- Watauga	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WaF---------- Watauga	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AHF*---------- Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BrB---------- Braddock	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Moderate: large stones.
BrD---------- Braddock	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope, large stones.
BuC*: Braddock---------	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope, large stones.
Urban land.						
CaF---------- Chandler	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CfB---------- Clifton	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Moderate: large stones.
CfD---------- Clifton	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
CfE---------- Clifton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Co---------- Colvard	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
EdE, EdF---------- Edneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EsF, EvE, EvF----- Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
FnD---------- Fannin	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
FnE---------- Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Pd*: Pits.						
Dumps.						
PsE, PsF---------- Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
To---------- Toxaway	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
TsD---------- Tusquitee	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
TsE---------- Tusquitee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
TUE*, TUF*: Tusquitee--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Spivey----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
WaD---------- Watauga	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
WaE, WaF---------- Watauga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AHF* Ashe	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope, thin layer.
BrB Braddock	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight	Poor: too clayey, hard to pack, small stones.
BrD Braddock	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack, small stones.
BuC*: Braddock	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack, small stones.
Urban land.					
CaF Chandler	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: hard to pack, slope.
CfB Clifton	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight	Poor: too clayey, hard to pack.
CfD Clifton	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
CfE Clifton	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too clayey, slope.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Co Colvard	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Fair: thin layer.
EdE, EdF Edneyville	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: seepage, slope.	Poor: slope.
EsF, EvE, EvF Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
FnD Fannin	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.
FnE Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pd*: Pits.					
Dumps.					

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PsE, PsF---------- Porters	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
To---------- Toxaway	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
TsD---------- Tusquitee	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
TsE---------- Tusquitee	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope, seepage.	Poor: slope.
TUE*, TUF*: Tusquitee----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope, seepage.	Poor: slope.
Spivey----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
WaD---------- Watauga	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.
WaE, WaF---------- Watauga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AHF* Ashe	Poor: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
BrB, BrD Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
BuC*: Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Urban land.				
CaF Chandler	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CfB Clifton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
CfD Clifton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
CfE Clifton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Co Colvard	Good	Probable	Improbable: too sandy.	Good.
EdE Edneyville	Fair: area reclaim, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
EdF Edneyville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
EsF Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
EvE Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
EvF Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
FnD Fannin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
FnE Fannin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Pd*: Pits.				
Dumps.				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
PsE--Porters	Fair: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
PsF--Porters	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
To--Toxaway	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
TsD--Tusquitee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
TsE--Tusquitee	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
TUE*:				
Tusquitee	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
Spivey	Fair: area reclaim, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
TUF*:				
Tusquitee	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
Spivey	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
WaD--Watauga	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
WaE--Watauga	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
WaF--Watauga	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AHF*---- Ashe	Severe: seepage, slope.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Depth to rock, slope.	Depth to rock, slope.
BrB---- Braddock	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable------	Favorable.
BrD---- Braddock	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
BuC*: Braddock---------- Urban land.	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
CaF---- Chandler	Severe: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
CfB---- Clifton	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable------	Favorable.
CfD, CfE---------- Clifton	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
Co---- Colvard	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Favorable------	Droughty.
EdE, EdF---------- Edneyville	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
EsF---- Evard	Severe: slope.	Severe: seepage, slope.	Severe: no water.	Deep to water	Large stones, slope, too sandy.	Large stones, slope.
EvE, EvF---------- Evard	Severe: slope.	Severe: seepage, slope.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope.
FnD---- Fannin	Slight---------	Slight---------	Severe: no water.	Deep to water	Slope----------	Slope.
FnE---- Fannin	Severe: slope.	Slight---------	Severe: no water.	Deep to water	Slope----------	Slope.
Pd*: Pits. Dumps.						
PsE, PsF---------- Porters	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope.
To---- Toxaway	Severe: seepage.	Severe: piping.	Slight---------	Flooding-------	Wetness--------	Wetness.
TsD---- Tusquitee	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
TsE---- Tusquitee	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
TUE*, TUF*:						
Tusquitee	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones.	Slope, large stones.
Spivey	Severe: seepage, slope.	Moderate: seepage, piping, large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
WaD Watauga	Slight	Slight	Severe: no water.	Deep to water	Slope	Slope.
WaE, WaF Watauga	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope	Slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AHF* Ashe	0-8	Gravelly fine sandy loam.	SM, SM-SC	A-2, A-4	15-35	80-90	75-90	60-90	30-49	<25	NP-7
	8-26	Loam, sandy loam, fine sandy loam.	SM, SM-SC	A-4	5-30	85-100	80-95	60-95	35-49	<25	NP-7
	26-38	Sandy loam	SM	A-2, A-4	15-30	75-95	70-95	55-95	30-49	---	NP
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BrB, BrD Braddock	0-8	Gravelly loam	SM, SC, GM, GC	A-1, A-2	5-30	60-85	50-75	30-60	15-35	<30	NP-10
	8-38	Clay loam, gravelly sandy clay, cobbly clay.	MH, CH, CL, SC	A-7, A-2	0-30	60-95	50-90	40-90	30-80	42-60	15-30
	38-80	Loam, sandy clay loam, very cobbly clay.	SC, CL	A-2, A-4, A-6, A-7	0-75	75-95	60-90	55-85	30-70	25-50	8-28
BuC*: Braddock	0-8	Gravelly loam	SM, SC, GM, GC	A-1, A-2	5-30	60-85	50-75	30-60	15-35	<30	NP-10
	8-38	Clay loam, gravelly sandy clay, cobbly clay.	MH, CH, CL, SC	A-7, A-2	0-30	60-95	50-90	40-90	30-80	42-60	15-30
	38-80	Loam, sandy clay loam, very cobbly clay.	SC, CL	A-2, A-4, A-6, A-7	0-75	75-95	60-90	55-85	30-70	25-50	8-28
Urban land.											
CaF Chandler	0-8	Loam	ML, MH	A-7	0-15	95-100	95-100	90-100	75-95	41-60	12-26
	8-80	Loam, fine sandy loam, silt loam.	ML, MH	A-7	5-25	95-100	95-100	90-100	75-95	41-60	12-26
CfB, CfD, CfE Clifton	0-5	Loam	ML, CL, CL-ML	A-4	0-15	95-100	80-100	75-95	60-75	<25	NP-10
	5-45	Clay, clay loam	ML, MH	A-7	0-5	95-100	85-100	75-100	60-85	41-61	12-25
	45-65	Fine sandy loam, loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	85-100	70-95	45-65	<25	NP-18
Co Colvard	0-10	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0-15	98-100	85-100	60-85	25-49	<30	NP-10
	10-42	Fine sandy loam, sandy loam, loam.	SM, SC, SM-SC	A-2, A-4	0-15	98-100	85-100	60-85	25-49	<30	NP-10
	42-60	Loamy sand, sand, cobbly sand.	SM, SP-SM, GM	A-2, A-1, A-4	0-20	40-95	30-95	25-85	10-35	---	NP
EdE, EdF Edneyville	0-8	Loam	ML, CL-ML, CL	A-4	0-5	85-100	80-100	70-90	51-65	<35	NP-10
	8-22	Fine sandy loam, sandy loam, loam.	SM, SM-SC ML, CL	A-2, A-4, A-6, A-7	0-15	85-100	80-100	65-90	35-75	25-42	6-15
	22-62	Fine sandy loam, sandy loam, loam.	SM, SM-SC, ML, CL	A-2, A-4 A-6, A-7	0-15	85-100	80-100	65-90	35-75	25-42	6-15
EsF Evard	0-7	Stony loam	SM	A-2	5-15	65-85	60-80	55-75	15-35	<30	NP-4
	7-32	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	32-90	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
EvE, EvF--------- Evard	0-7	Loam----------	CL, ML, CL-ML	A-4	0-5	90-100	90-100	85-95	60-75	<35	NP-9
	7-32	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	32-36	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	36-90	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
FnD, FnE--------- Fannin	0-5	Loam----------	CL, SC	A-4, A-6	5-15	95-100	90-100	60-95	36-85	22-38	8-18
	5-21	Clay loam, sandy clay loam, silty clay loam.	ML, MH	A-4, A-7	2-10	98-100	95-100	85-95	60-85	35-55	9-23
	21-72	Loam, sandy loam, fine sandy loam.	SM	A-2, A-4	0-15	75-100	70-95	60-90	15-50	---	NP
Pd*: Pits.											
Dumps.											
PsE, PsF--------- Porters	0-11	Stony loam-------	ML, SM, SM-SC	A-2, A-4	5-15	75-95	70-85	50-70	30-55	<30	NP-7
	11-42	Loam, sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	5-25	75-99	60-99	50-90	30-50	<25	NP-7
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
To---------- Toxaway	0-58	Loam----------	CL, ML, CL-ML, MH	A-4, A-6, A-7	0	98-100	95-100	85-100	51-90	25-55	6-22
	58-72	Stratified sandy clay loam to sand.	CL, ML, SM, SC	A-2, A-4, A-6	5-15	95-100	85-100	60-95	25-90	<30	NP-15
TsD, TsE--------- Tusquitee	0-10	Loam----------	ML, CL-ML, CL	A-4	2-10	85-100	80-100	70-90	50-65	<35	NP-7
	10-56	Loam, sandy loam, fine sandy loam.	SM-SC, SM	A-4	2-15	90-100	75-100	65-95	36-50	25-40	6-15
	56-60	Gravelly sandy loam, gravelly fine sandy loam.	GM, SM-SC, SM, GM-GC	A-4, A-1, A-2	15-50	45-90	40-85	30-75	13-50	<25	NP-7
TUE*: Tusquitee-------	0-10	Stony loam-------	ML, SM	A-2, A-4	5-15	75-95	70-85	50-70	30-55	<30	NP-7
	10-56	Loam, sandy loam, fine sandy loam.	SM-SC, SM	A-4	2-15	90-100	75-100	65-95	36-75	25-40	6-15
	56-60	Gravelly sandy loam, gravelly fine sandy loam.	GM, SM-SC, SM, GM-GC	A-4, A-1, A-2	15-50	45-90	40-85	30-75	13-50	<25	NP-7
Spivey----------	0-60	Stony loam-------	GM, GC, SM, GM-GC	A-2, A-4	15-30	45-75	40-70	35-50	25-40	15-28	2-10
TUF*: Tusquitee-------	0-10	Stony loam-------	ML, SM	A-2, A-4	5-15	75-95	70-85	50-70	30-55	<30	NP-7
	10-56	Loam, sandy loam, fine sandy loam.	SM-SC, SM	A-4	2-15	90-100	75-100	65-95	36-75	25-40	6-15
	56-60	Gravelly sandy loam, gravelly fine sandy loam.	GM, SM-SC, SM, GM-GC	A-4, A-1, A-2	15-50	45-90	40-85	30-75	13-50	<25	NP-7
Spivey----------	0-60	Stony loam-------	GM, GC, SM, GM-GC	A-2, A-4	15-30	45-75	40-70	35-50	25-40	15-28	2-10
WaD, WaE, WaF---- Watauga	0-5	Loam----------	SM, SM-SC, SC, ML	A-4	0-15	90-100	90-98	70-90	36-65	<30	NP-10
	5-33	Clay loam, loam, sandy clay loam.	SC, CL	A-6, A-7	0-15	85-100	85-98	75-95	40-75	30-49	12-25
	33-72	Loam, sandy loam, fine sandy loam.	SM	A-2, A-4	0-15	75-100	70-95	60-90	15-50	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
AHF*----------	0-8	2.0-6.0	0.10-0.13	4.5-6.0	Low----------	0.17	2	1-3
Ashe	8-26	2.0-6.0	0.10-0.14	4.5-6.0	Low----------	0.17		
	26-38	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.17		
	38	---	---	---	----------	----		
BrB, BrD----------	0-8	0.6-6.0	0.12-0.18	3.6-5.5	Low----------	0.24	4	.5-1
Braddock	8-38	0.6-2.0	0.14-0.19	3.6-5.5	Moderate-------	0.24		
	38-80	0.6-6.0	0.06-0.12	3.6-5.5	Low----------	0.24		
BuC*:								
Braddock--------	0-8	0.6-6.0	0.12-0.18	3.6-5.5	Low----------	0.24	4	.5-1
	8-38	0.6-2.0	0.14-0.19	3.6-5.5	Moderate-------	0.24		
	38-80	0.6-6.0	0.06-0.12	3.6-5.5	Low----------	0.24		
Urban land.								
CaF----------	0-8	2.0-6.0	0.12-0.18	4.5-6.0	Low----------	0.15	2	1-3
Chandler	8-80	2.0-6.0	0.11-0.15	4.5-6.0	Low----------	0.15		
CfB, CfD, CfE----	0-5	2.0-6.0	0.12-0.15	4.5-6.5	Low----------	0.17	4	1-3
Clifton	5-45	0.6-2.0	0.15-0.20	4.5-6.5	Low----------	0.17		
	45-65	2.0-6.0	0.11-0.15	4.5-6.5	Low----------	0.17		
Co----------	0-10	2.0-6.0	0.09-0.12	5.1-7.8	Low----------	0.15	4	1-2
Colvard	10-42	2.0-6.0	0.09-0.12	5.1-7.8	Low----------	0.10		
	42-60	6.0-20	0.06-0.10	5.1-7.8	Low----------	0.10		
EdE, EdF---------	0-8	0.6-2.0	0.12-0.18	4.5-6.0	Low----------	0.28	4	1-3
Edneyville	8-22	0.6-2.0	0.14-0.16	4.5-6.0	Low----------	0.20		
	22-62	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.24		
EsF----------	0-7	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.15	5	<2
Evard	7-32	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.24		
	32-90	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.24		
EvE, EvF---------	0-7	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.28	5	<2
Evard	7-32	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.24		
	32-36	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.24		
	36-90	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.24		
FnD, FnE---------	0-5	2.0-6.0	0.10-0.16	4.5-6.0	Low----------	0.24	3	1-3
Fannin	5-21	0.6-2.0	0.11-0.17	4.5-6.0	Low----------	----		
	21-72	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	----		
Pd*:								
Pits.								
Dumps.								
PsE, PsF---------	0-11	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.17	4	3-8
Porters	11-42	2.0-6.0	0.10-0.17	4.5-6.0	Low----------	0.24		
	42	---	---	---	----------	----		
To----------	0-58	0.6-2.0	0.15-0.20	5.1-6.5	Low----------	0.17	5	2-5
Toxaway	58-72	2.0-20	0.05-0.15	5.1-6.5	Low----------	0.17		
TsD, TsE---------	0-10	0.6-2.0	0.12-0.18	4.5-6.0	Low----------	0.28	4	3-8
Tusquitee	10-56	0.6-2.0	0.15-0.21	4.5-6.0	Low----------	0.20		
	56-60	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.20		
TUE*, TUF*:								
Tusquitee-------	0-10	2.0-6.0	0.11-0.22	4.5-6.0	Low----------	0.17	4	3-8
	10-56	0.6-2.0	0.15-0.21	4.5-6.0	Low----------	0.20		
	56-60	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.20		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
TUE*, TUF*:								
Spivey----------	0-60	0.6-6.0	0.06-0.11	4.5-5.5	Low----------	0.17	4	---
WaD, WaE, WaF----	0-5	2.0-6.0	0.13-0.17	4.5-6.0	Low----------	0.24	3	1-3
Watauga	5-33	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.28		
	33-72	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.24		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "apparent" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
AHF*---------- Ashe	B	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	High.
BrB, BrD---------- Braddock	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
BuC*: Braddock---------	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
Urban land.											
CaF---------- Chandler	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High.
CfB, CfD, CfE----- Clifton	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
Co---------- Colvard	B	Occasional	Very brief	Jan-Dec	4.0-6.0	Apparent	Dec-Apr	>60	---	Low------	Moderate.
EdE, EdF---------- Edneyville	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High.
EsF, EvE, EvF----- Evard	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
FnD, FnE---------- Fannin	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Pd*: Pits.											
Dumps.											
PsE, PsF---------- Porters	B	None--------	---	---	>6.0	---	---	40-72	Hard	Low------	High.
To---------- Toxaway	B/D	Frequent----	Very brief	Nov-Mar	0-1.0	Apparent	Nov-Apr	>60	---	High-----	Moderate.
TsD, TsE---------- Tusquitee	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
TUE*, TUF*: Tusquitee--------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Spivey----------	B	None--------	---	---	>6.0	---	---	>60	Hard	Low------	Moderate.
WaD, WaE, WaF----- Watauga	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO[1]	Unified	No. 4	No. 10	No. 40	No. 200	0.02 mm	0.005 mm	0.002 mm			Max. dry density	Optimum moisture
										Pct		Lb/ft^3	Pct
Clifton loam:[2] (S79NC-5-5)													
Bt----------10 to 38	A-7-5 (21)	MH	100	100	95	73	65	53	43	61	25	94	27
C----------58 to 80	A-7-6 (11)	MH	100	100	94	59	40	22	15	58	18	93	25
Edneyville loam:[3] (S79NC-5-2)													
Bt2----------12 to 22	A-7 (08)	ML	99	98	86	70	59	36	24	41	12	103	21
C----------28 to 62	A-4 (00)	SM	100	99	65	35	24	12	8	30	6	112	15
Evard loam:[3] (S79NC-5-3)													
Ap----------0 to 7	A-4 (05)	ML	93	92	86	62	44	27	16	34	9	105	18
Bt2----------12 to 32	A-6 (11)	ML	100	100	95	69	46	33	27	45	16	104	20
C----------36 to 90	A-4 (00)	SM	94	93	83	47	17	8	6	--	NP	106	16
Toxaway loam:[4] (S79NC-5-4)													
Ap----------0 to 11	A-6 (08)	ML	100	100	96	58	40	21	11	49	15	90	28
Cg1----------11 to 27	A-6 (12)	MH	100	100	97	62	47	34	25	53	21	96	24
Cg2----------27 to 42	A-6 (10)	CL	100	100	96	63	46	33	24	44	18	99	22

[1]Group index number based on AASHTO Designation M-145-66.

[2]Pedon is located 8.0 miles southwest of Jefferson, 0.4 mile west of the intersection of North Carolina Highway 194 and State Road 1208, and 10 feet east of North Carolina Highway 194.

[3]Typical pedon for the series.

[4]Pedon is located 1.2 miles west of Jefferson, 100 feet south of North Carolina Highway 163, and 50 feet north of Beaver Creek.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Ashe	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Braddock	Clayey, mixed, mesic Typic Hapludults
Chandler	Coarse-loamy, micaceous, mesic Typic Dystrochrepts
Clifton	Clayey, mixed, mesic Typic Hapludults
Colvard	Coarse-loamy, mixed, nonacid, mesic Typic Udifluvents
Edneyville	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
Fannin	Fine-loamy, micaceous, mesic Typic Hapludults
Porters	Coarse-loamy, mixed, mesic Umbric Dystrochrepts
Spivey	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Toxaway	Fine-loamy, mixed, nonacid, mesic Cumulic Humaquepts
Tusquitee	Coarse-loamy, mixed, mesic Umbric Dystrochrepts
Watauga	Fine-loamy, micaceous, mesic Typic Hapludults

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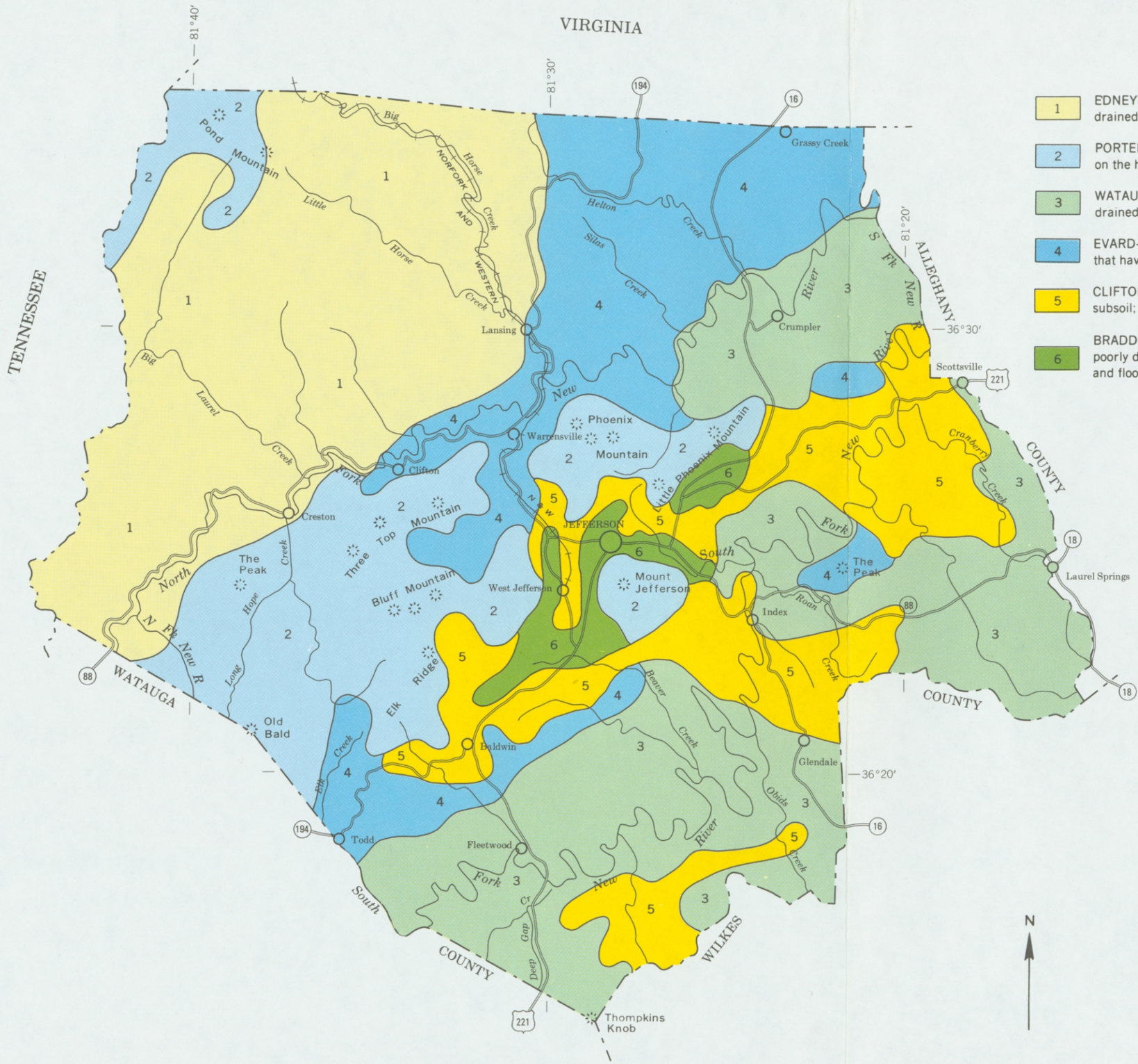


LEGEND

1. EDNEYVILLE-ASHE: Moderately steep to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil; on uplands at elevations of 3,000 to 4,000 feet
2. PORTERS-TUSQUITEE-SPIVEY: Sloping to very steep, well drained soils that have a loamy subsoil; on the higher mountains at elevations above 3,500 feet
3. WATAUGA-FANNIN-CHANDLER: Sloping to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil; on uplands at elevations of 2,600 to 3,500 feet
4. EVARD-ASHE: Moderately steep to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil; on uplands at elevations of 2,700 to 3,500 feet
5. CLIFTON-EVARD-FANNIN: Gently sloping to steep, well drained soils that have a clayey or loamy subsoil; on uplands at elevations of 2,600 to 3,200 feet
6. BRADDOCK-TOXAWAY: Nearly level to strongly sloping, well drained, poorly drained, and very poorly drained soils that have a dominantly clayey subsoil or loamy underlying material; on terraces and flood plains

Compiled 1983

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE
ASHE COUNTY BOARD OF COMMISSIONERS

GENERAL SOIL MAP

ASHE COUNTY, NORTH CAROLINA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

INDEX TO MAP SHEETS

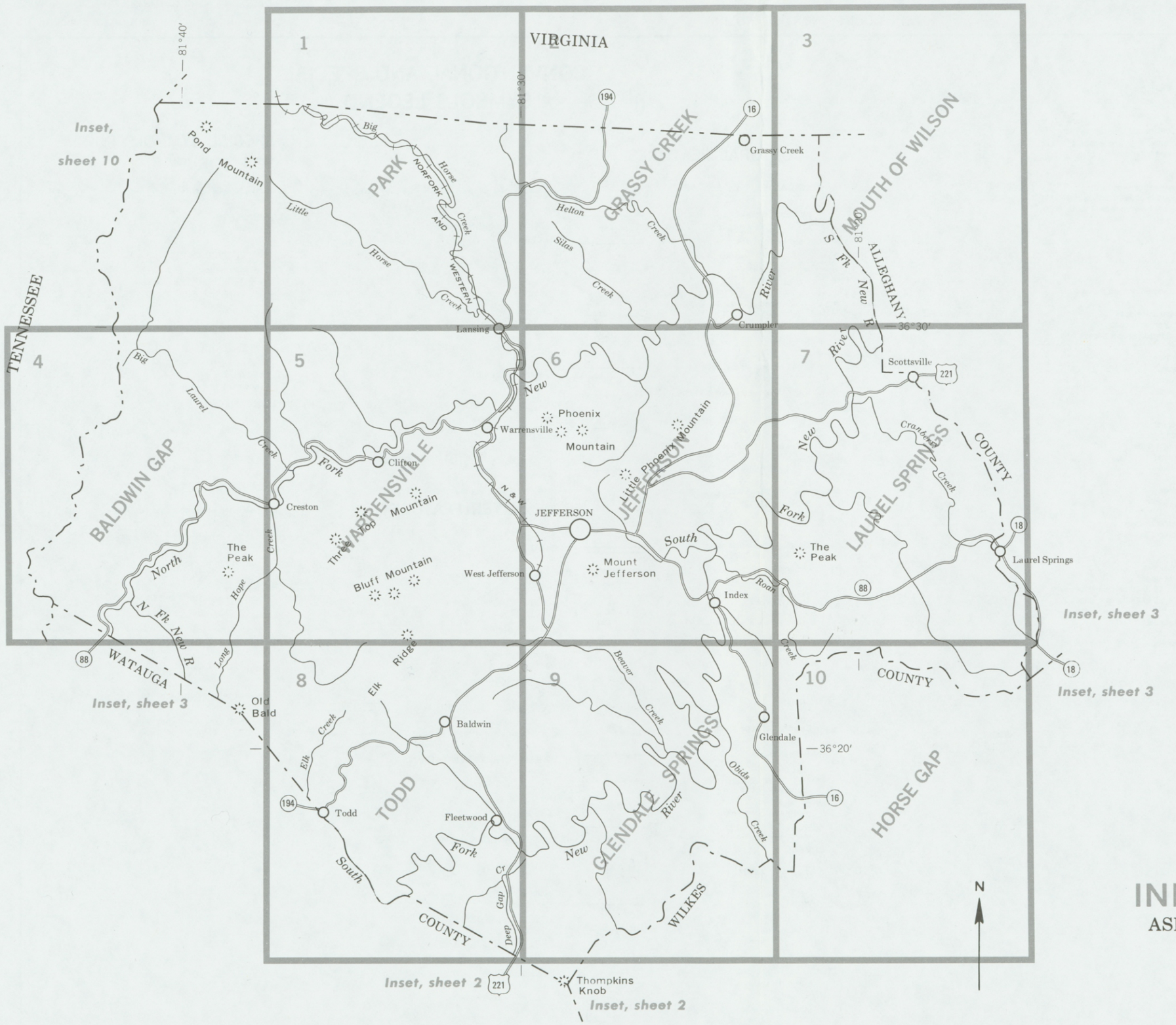
ASHE COUNTY, NORTH CAROLINA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

N



UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ASHE COUNTY, NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE
ASHE COUNTY BOARD OF COMMISSIONERS

SOIL LEGEND

The first letter of the map symbol, always a capital, is the initial letter of the soil name. The second letter is a small letter. The third letter, if used, is a capital letter and connotes slope class. Symbols without a slope letter are for nearly level soils or miscellaneous areas.

Most units in the legend are narrowly defined. Soil names followed by the superscript 1/ are broadly defined units. The composition of these units is more variable than others in the survey area, but mapping has been controlled well enough to be interpreted for the expected use of the soils.

SYMBOL	NAME
AHF	Ashe gravelly fine sandy loam, 25 to 65 percent slopes 1/
BrB	Braddock gravelly loam, 2 to 8 percent slopes
BrD	Braddock gravelly loam, 8 to 15 percent slopes
BuC	Braddock-Urban land complex, 2 to 15 percent slopes
CaF	Chandler loam, 25 to 65 percent slopes
CfB	Clifton loam, 2 to 8 percent slopes
CfD	Clifton loam, 8 to 15 percent slopes
CfE	Clifton loam, 15 to 25 percent slopes
Co	Colvard fine sandy loam
EdE	Edneyville loam, 15 to 25 percent slopes
EdF	Edneyville loam, 25 to 45 percent slopes
EsF	Evard stony loam, 25 to 60 percent slopes
EvE	Evard loam, 15 to 25 percent slopes
EvF	Evard loam, 25 to 45 percent slopes
FnD	Fannin loam, 8 to 15 percent slopes
FnE	Fannin loam, 15 to 25 percent slopes
Pd	Pits-Dumps complex
PsE	Porters stony loam, 15 to 25 percent slopes
PsF	Porters stony loam, 25 to 65 percent slopes
To	Toxaway loam
TsD	Tusquitee loam, 8 to 15 percent slopes
TsE	Tusquitee loam, 15 to 25 percent slopes
TUE	Tusquitee and Spivey stony soils, 15 to 25 percent slopes 1/
TUF	Tusquitee and Spivey stony soils, 25 to 45 percent slopes 1/
WaD	Watauga loam, 8 to 15 percent slopes
WaE	Watauga loam, 15 to 25 percent slopes
WaF	Watauga loam, 25 to 45 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES
- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label) — Hedley Airstrip

Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS
- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS
- Interstate — 21
- Federal — 173
- State — 28
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad

DAMS
- Large (to scale)
- Medium or small — water / w

PITS
- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS
- Perennial — water / w
- Intermittent — int / i

MISCELLANEOUS WATER FEATURES
- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — CnB / WaC

ESCARPMENTS
- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) — S

MISCELLANEOUS
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

U. S. DEPARTMENT OF AGRICULTURE
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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

ASHE COUNTY, NORTH CAROLINA NO. 1

U. S. DEPARTMENT OF AGRICULTURE
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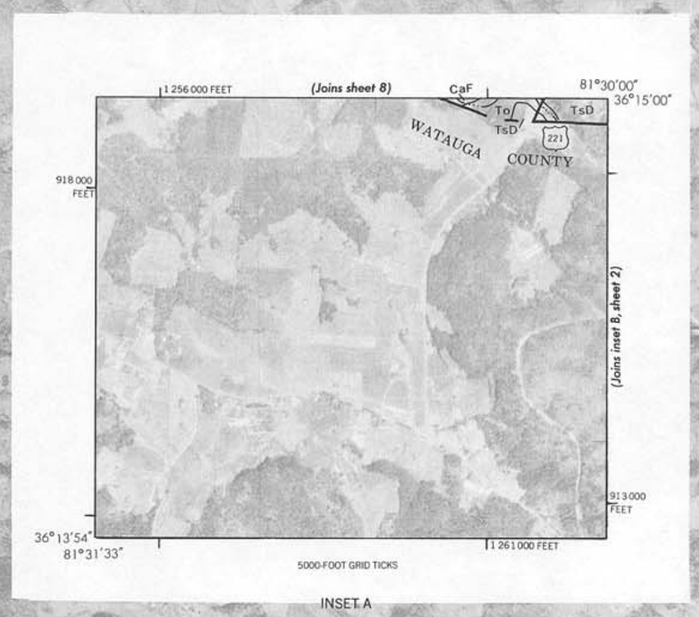
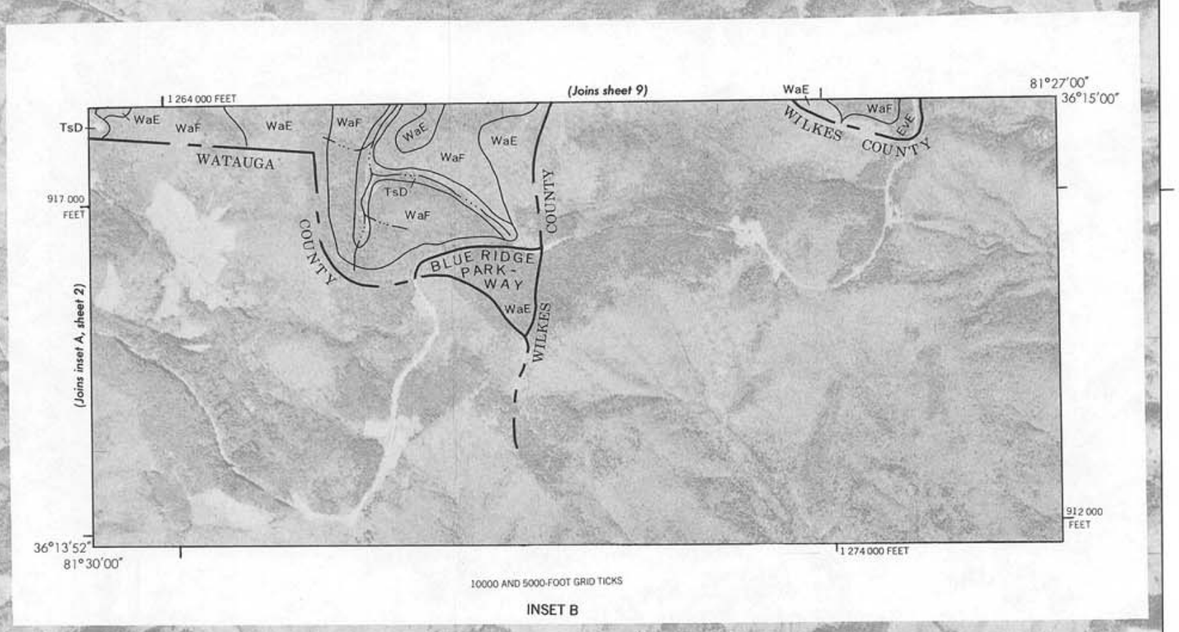
SHEET NUMBER 2
ASHE COUNTY, NORTH CAROLINA



INSET A



INSET B

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

ASHE COUNTY, NORTH CAROLINA NO. 2

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 3
ASHE COUNTY, NORTH CAROLINA

1 310 000 FEET — 81°15'00" — 36° 37'30"

1 050 000 FEET

960 000 FEET

1 210 000 FEET — 81°37'30" — 36° 22'30"

(Joins sheet 4)

(Joins sheet 8)

952 000 FEET

36°20'05" — 81°41'45"

1 220 000 FEET

10000 AND 8000-FOOT GRID TICKS

INSET A

GRAYSON COUNTY VIRGINIA

Weaversford

Chestnut Hill

(Joins sheet 2)

(Joins sheet 7)

water

1 330 000 FEET

1 340 000 FEET — 81°16'35" — 36° 23'25"

970 000 FEET

(Joins sheet 7)

963 000 FEET

1 345 000 FEET

36°22'30" — 81°15'00"

(Joins inset C, sheet 3)

7000 AND 5000-FOOT GRID TICKS

INSET B

(Joins inset B, sheet 3)

1 340 000 FEET — 81°16'20" — 36°22'30"

962 000 FEET

(Joins sheet 10)

960 000 FEET

36°21'35" — 81°15'00"

1 344 000 FEET

2000 AND 4000-FOOT GRID TICKS

INSET C

1 010 000 FEET

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

ASHE COUNTY, NORTH CAROLINA NO. 3

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

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SHEET NUMBER 5
ASHE COUNTY, NORTH CAROLINA

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

ASHE COUNTY, NORTH CAROLINA NO. 5

SHEET NO. 5 OF 10

U. S. DEPARTMENT OF AGRICULTURE
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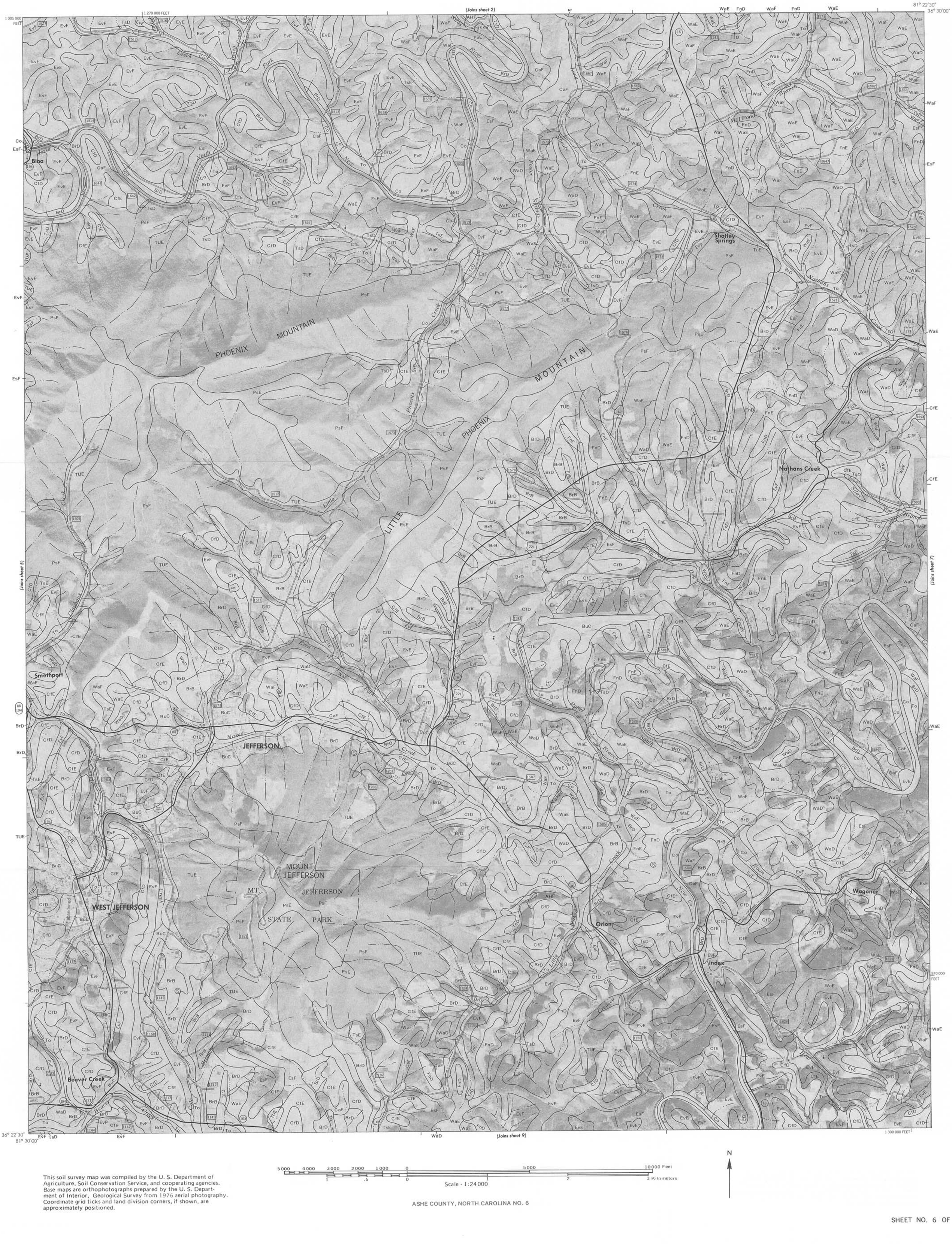
SHEET NUMBER 6
ASHE COUNTY, NORTH CAROLINA



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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

ASHE COUNTY, NORTH CAROLINA NO. 6

5000 4000 3000 2000 1000 0 5000 10 000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24 000

N

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SHEET NUMBER 8
ASHE COUNTY, NORTH CAROLINA

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

ASHE COUNTY, NORTH CAROLINA NO. 8

SHEET NO. 8 OF 10

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 9
ASHE COUNTY, NORTH CAROLINA

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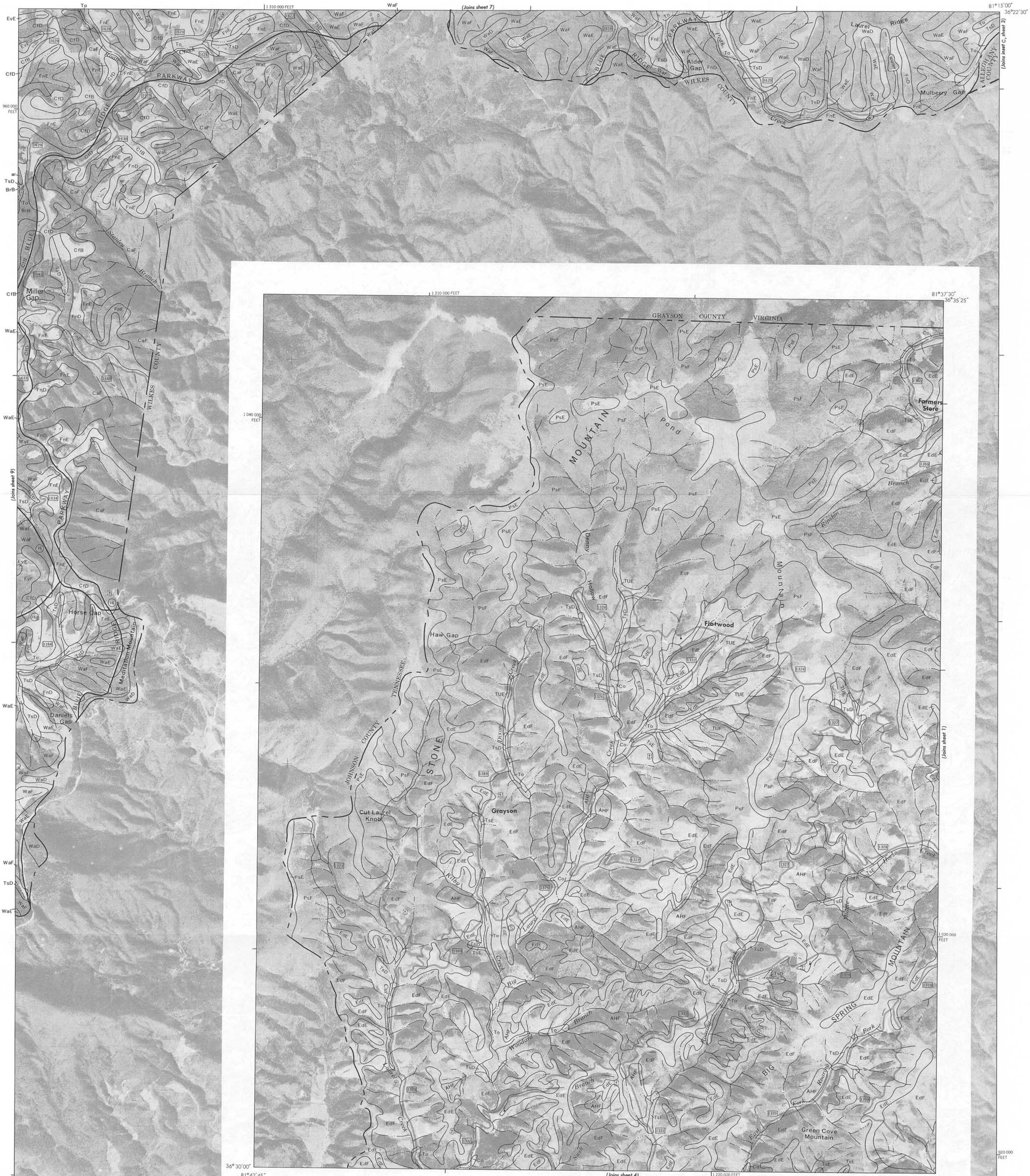
5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

ASHE COUNTY, NORTH CAROLINA NO. 9

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 10
ASHE COUNTY, NORTH CAROLINA



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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

ASHE COUNTY, NORTH CAROLINA NO. 10

SHEET NO. 10 OF 10